SPACE DIVISION:
A CHRONOLOGY,
1980 - 1984

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Space Division

FOREWORD

The Space Division of Air Force Systems Command was created on 1 October 1979, as a successor to the Space and Missile Systems Organization (SAMSO). This chronology covers the history of Space Division during the first five years of its existence, and constitutes a sequel to an earlier work that covered the history of SAMSO and its predecessors over a 25-year span (see Space and Missile Systems Organization: A Chronology, 1954-1979). It is composed of three principal sections: an introductory overview, the chronology itself, and a series of appendices. The overview is a brief, narrative summary of the activities of Space Division from 1979 to 1984. The chronology, as the name indicates, is a detailed listing of key events arranged by date. The various appendices are designed to amplify and clarify certain aspects of Space Division's history. An index has been provided to assist the reader in finding specific information more readily.

The Chronology was compiled by Dr. J. Catherene Kilman, assisted by other members of the History Office staff. The staff hopes that it will serve as a quick reference guide to Space Division history, and that it will prove helpful in orienting newly assigned personnel. We would appreciate any comments or suggestions for improving future editions.

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TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

SPACE DIVISION

An Overview

1 October 1979 - 30 September 1984

Organization

Space Division was created on 1 October 1979 as a successor to the Space and Missile Systems Organization (SAMSO). The Air Force assigned all of its space systems functions to Space Division (SD), and transferred the ballistic missile and re-entry functions to the Ballistic Missile Office (BMO) at Norton AFB. The succeeding five years would see rapid institutional growth with the addition of the Space Technology Center, the Strategic Defense Initiative Program, the construction of Shuttle facilities for the Space Transportation System, and the development of a Consolidated Space Operations Center. Satellite and launch vehicle programs continued to produce and to grow. To bring talent to these programs, the Space Division commanders placed great emphasis on attracting and retaining qualified military and civilian personnel through special pay incentives, quality-of-life concerns and affordable housing.

The original organization, Western Development Division (WDD), was formed in 1954 with the express mission of developing ballistic missile systems. The increasing importance of space technologies led to the formal inclusion of development of satellites and launch vehicles in its mission. Between 1954 and 1979, Air Force Systems Command merged and separated the space technologies development and the ballistic missile development three times--1960 (separated), 1967 (merged) and 1979 (separated). The separations were for reasons of mission divergence; the merger was for

economy. The organizational names and structures were also changed: WDD became the Air Force Ballistic Missile Division (1957); shortly thereafter (1960), AFSC split BMD's space mission from its ballistic missile/re-entry systems mission. The Ballistic Systems Division was dedicated to missile development at Norton AFB, and Space Systems Division assumed the space mission at Los Angeles AFS. In 1967, the two organizations reunited as the Space and Missile Systems Organization, and separated again into Space Division and Ballistic Missile Office in 1979.

A major Air Force decision would affect SD's future. At the same time that SD was created, the Air Staff contemplated the formation of a Space Command that would control the operation, development, and acquisition phases of space-related functions. It was anticipated that Space Division would become a part of the new command. The Air Force however decided to limit the mission of the new command to operations, and to leave Space Division--with its development and acquisition mission--under the Air Force Systems Command. The new operational Space Command was created in September 1982, and was based on the Aerospace Defense Center of the Aerospace Defense Command (ADCOM). It was located near ADCOM's Cheyenne Mountain Complex in Colorado Springs, Colorado. It was to become a unified command later, controlling components of other commands in wartime. Although Space Division did not become a part of Space Command, the two organizations were to be closely linked. Space Command would be the customer for systems developed by Space Division, and would supply the user needs and operational requirements that would guide Space Division in its development activities.

Since 1979, there were some major changes in Space Division's organizational structure. These changes reflected Air Force concerns about management and control of technology specifically within the space program.

The changes were both within and without the organization. They involved the addition of major new technological responsibilities and a realignment of internal structure. The Air Force Space Technology Center (STC) was activated in October 1982 at Kirtland AFB, NM. Authorized at the same time that the new Air Force Space Command was activated, it was organizationally unrelated to it and independent of it. The STC centralized Air Force space technology planning and development by managing and integrating the space technology efforts of the Air Force Weapons Laboratory, the Air Force Rocket Propulsion Laboratory, and the Air Force Geophysics Laboratory. It was part of a major realignment in the management of research within AFSC aimed at more closely integrating technological developments in research with the needs of the users. Its assignment to a product division instead of to the AFSC Director of Laboratories reflected AFSC's intention to promote closer control of technological developments by the user-oriented product divisions. Safeguard procedures were intended to maintain the Center's research integrity.

STC became one of the major organizations which reported directly to the SD Commander. Four "deputy commanders" had been created in June 82 when SD reorganized in a move designed to decentralize the Commander's authority. Each deputy commander was responsible for one of the major mission areas of Space Division. By the end of 1984, organizational responsibilities had been defined. The Deputy Commander for Space Systems controlled the design, development, procurement, test and evaluation of all satellites, payload systems and projects assigned to SD. The Deputy Commander for Launch and Control systems managed the development, acquisition and launch operations of expendable launch vehicles, upper stages, the DoD elements of the Space Transportation System, and the on-orbit control and evaluation of DoD

satellites through the Air Force Satellite Control Facility. The Deputy Commander for Launch Operations also served as the commander of the Space and Missile Test Organization (SAMTO). This officer was responsible for SD's testing functions, and managed and directed two centers for launch and range operations, the Eastern and Western Space and Missile Centers (ESMC and WSMC), including the Space Shuttle launches planned from WSMC. The Commander of the Space Technology Center managed the development of space technology and planning.

Personnel Matters

Space Division invested considerable effort in matters concerning its personnel. Three issues were of primary importance: affordable housing for the military, military staffing levels, and special pay rates for clerical employees. It was also concerned with the quality of life for its military personnel, as it constructed a commissary, began construction on a child care center, and established a Family Services Center.

The Los Angeles metropolitan area's housing costs made it difficult for Space Division to attract military personnel to Los Angeles AFS. The Air Force had instituted several programs to alleviate the burdensome housing costs in expensive urban areas like Los Angeles. Generally speaking, the aid limits were too low to provide the financial relief required to maintain an adequate military population here.

Space Division decided to address the problem by building family housing for its military personnel. It had acquired a fort no longer needed by the Army, Fort MacArthur (named after General Douglas MacArthur's father) in San Pedro, CA. The fort provided area sufficient to build 370 townhouses for senior enlisted and junior officers. (It already had 43

houses occupied by Army personnel per the transfer agreement reached between the Air Force and the Army when SD acquired Ft. MacArthur.) The construction was delayed for several years due to funding problems, but groundbreaking finally took place 19 Nov 1981. By the close of FY 1984, 200 Air Force families were housed at the fort. Space Division sought more land for additional housing at White Point, former Army land near the San Pedro shore. Some local residents opposed the construction of military family housing on White Point, and the City of Los Angeles did not respond to Space Divisions's overtures for reclaiming part of the land. By the end of FY 84, the SD commander had begun appealing to the Secretary of Defense for support in obtaining reversion of the land on the basis of military need.

Like all R&D organizations, SD had a major problem in acquiring and retaining qualified scientific and engineering officers. It began an aggressive program of recruitment in colleges to entice science and engineering majors into the Air Force. It also began creatively searching for ways to ferret out available science and engineering officers. By the middle of this five year period, SD had succeeded to the point that it was staffed above AFSC levels.

The problem then arose that the incoming junior officers lacked the experience of their predecessor officers in their respective fields. SD attacked the problem by creating new training modalities and actively pursuing training alternatives. One of the most successful was the bid to host the western branch of the Defense Systems Management College. Success once again created a problem: retention of both the newly trained and the experienced officer. SD attempted to deal with this problem by securing stabilized tours for its military personnel and by rewarding reenlistment with money bonuses.

Retention of qualified personnel in its civilian arena was likewise a problem, but SD was limited by Office of Personnel Management policies regarding civil servants. Space Division was the hub of a more than thirty-square-mile concentration of the aerospace industry. Senior and professional personnel normally lived in the outlying areas, but clerical personnel were drawn from the local area. SD thus contended for its secretaries, typists and clerks in a highly competitive environment. It faced the same retention problem in this area that it faced in the science/engineering fields: once trained, personnel could make considerably more money in the aerospace industry. To combat this problem, SD attempted for several years to acquire special pay rates for its affected civilian personnel. Ultimately it was forced to appeal to the Secretary of the Air Force for assistance. OPM granted the rate increase; but a new problem arose when it refused to grant cost of living increases to those General Schedule grades (2-7) receiving the special pay rates. This refusal resulted in slippage again as the personnel sought better paying positions in local businesses. Retention of trained clerical personnel remained a problem at the end of FY 84.

Quality-of-life issues were also a special concern of SD. It constructed and opened a commissary for its military community. The commissary project was plagued by delays, both in funding and in the actual construction, but was finally opened in June 1983. A planned child care center likewise was delayed in funding, design and construction; by the end of FY 84, construction still had not begun. Los Angeles' very large metropolitan area created special morale problems among its uniformed personnel. Military families lived in widely dispersed areas, sometimes as much as 40 or more miles from the station. They were subject to the same

stresses felt by most urban families. To assist its people in dealing with the problem of a dispersed, non-cohesive community, SD opened a Family Service Center at Los Angeles AFS and a second at Ft. MacArthur.

MISSION RESPONSIBILITIES

Space Division was responsible for DoD research, development, acquisition, launch and on-orbit command and control of military space systems. It also served as the executive agent for DoD in all matters pertaining to the development of the Space Transportation System. As indicated above, Space Division's responsbilities were divided among the Deputy Commander for Launch Systems, the Deputy Commander for Launch and Control Systems, the Commander of SAMTO, and the Commander of the AF Space Technology Center. All the duties of the Deputy Commander for Space Systems, and most of those of the Deputy Commander for Launch and Control, were carried out at Space Division Headquarters; the remaining responsibilities were implemented by subordinate units. This chronology will focus on the activities performed at the headquarters, and allow the historians in the subordinate units to cover the activities of their own organizations.

Space Transportation System

The Space Shuttle orbiter was a thick-bodied, delta-winged, aerodynamic space vehicle. It was launched with rocket engines from a vertical position and glided to a horizontal landing. Its main engines fed off an external fuel tank attached to its belly, while a pair of solid rocket boosters attached to either side of the fuel tank provided additional thrust. The

boosters dropped off 120 seconds after launch and were recovered and reused. The external tanks dropped off after later use, before the shuttle achieved final orbit. (These tanks were not recovered, since their recovery and reuse were not economical.)

Development of the STS was compartmentalized: NASA was responsible for development of the Space Shuttle vehicle (the orbiter, the external tank, solid rocket boosters, etc.) and for the development and operation of the east coast launch and landing facilities. DoD was to develop one of the main upper stages, and was responsible for the construction and operation of the west coast launch and landing facilities. Additionally, it was to develop a missions operations system that would fulfill its own requirements. Space Division acted as the manager for DoD interests in the Shuttle.

Technological problems delayed the initial flights of the orbiter repeatedly. Extraordinary care in development and production was necessary since the orbiter vehicles carried crews. Initially scheduled to fly in early 1979, the first orbiter did not actually fly until mid-1981. The first three flights were experimental, and did not carry effective payloads. Thus, agencies that had manifested payloads on the Shuttle saw the launch schedule slip. Longer turnaround times for preparation of the orbiters further postponed certain critical payload launches.

Technological problems and mounting costs convinced DoD that it was not feasible to be solely dependent upon the Shuttle. The STS was originally conceived as a total answer for all space transportation needs. The Shuttle alone could carry payloads into low earth orbit; when used with an upper stage, it could send payloads into higher altitude orbits or into interplanetary space. Shuttle development delays forced some payloads that

had been scheduled for the STS to be changed from the Shuttle to expendable launch vehicles in order to meet user deadlines. Planners had to switch (at least temporarily) from the single-fleet concept to a mixed fleet concept of expendable launch vehicles and the reusable orbiters. SD therefore began to acquire more Titan III (34)D launch vehicles as a backup for critical DoD missions. This decision was not easily reached, since considerable planning and capital investment had already been put into the single-vehicle fleet concept.

NASA and the Air Force determined that the Shuttle's full operational potential required the development of new complementary upper stages: the Payload Assist Module (PAM) to lift relatively small payloads, and an Inertial Upper Stage (IUS) to lift larger loads. The PAM was developed under the auspices of NASA, while DoD and Space Division as its agent undertook the development of the IUS. DoD had agreed in 1973 to develop the IUS as a simple modification of some existing upper stage. But by the time the full-scale development contract had been awarded in 1978, the Air Force had decided to make the IUS the most reliable upper stage ever developed. A redundant avionics system that would automatically correct its own anomalies in flight was the primary mechanism for accomplishing this goal. The Air Force decided to expand the market for the IUS by using the upper stage on its newest planned expendable launch vehicle, the Titan III (34)D, as well as on the Space Shuttle.

By the beginning of FY 1980, Space Division was involved in restructuring the IUS's full-scale development contract because of cost and schedule overruns. The program continued to suffer from managerial problems, including another overrun and restructuring of the contract in 1981, exacerbated by several NASA cancellations of vehicles in the projected

production contracts. These problems made the IUS much more expensive than the Air Force had intended.

The IUS's technological development initially appeared to be a happy contrast to its cost and scheaule problems. The contractor had resolved successfully all the difficulties in the areas of software, propellant and exit cones before Space Division conducted the first follow-on test firings of the solid rocket motors. Twelve development test firings followed by twelve qualification test firings had been completed without a failure. The first launch of an IUS, which took place on the first launch of a Titan (34)D in October 1982, placed its DSCS payloads into near-perfect geosynchronous orbits. However, the IUS's second launch caused the program to come to a standstill for about two years. On its sixth mission, the Space Shuttle launched the IUS in April 1983; the upper stage experienced a malfunction in its second stage that left NASA's Tracking and Data Relay Satellite (TDRSS-A) in the wrong orbit. Although NASA corrected the orbit using the satellite's maneuvering thrusters, the anomaly damaged confidence in the IUS's presumed reliability. To restore it, the program office and the contractor spent the rest of FY 1983 and all of FY 1984 in pinpointing the failure and devising a correction.

The largest and most expensive part of the Shuttle program for the Air Force involved the construction of the west coast launch and landing facilities at Vandenberg AFB. These facilities would be used to process the orbiter, its solid rocket boosters, its external fuel tank, and its payloads. The west coast center was initially conceived as being fully equivalent to Kennedy Space Center, but funding constraints forced a more modest endeavour. Multiple factors delayed the construction project: design indecision by NASA, archeological and environmental issues, funding

problems, technological difficulties, and labor problems. Originally scheduled for initial launch capability in mid 1983, the Vandenberg Shuttle facilities had not been completed by the end of FY 1984.

Mission operations included the technological hard and software requirements for mission operations, the need to protect classified data and the personnel to perform the tasks. Space Division's detachment at NASA's Johnson Space Center, the Manned Space Flight Support Group, was the training ground for the future DoD Shuttle ground operators; additionally, they supervised NASA 's security improvements and acted as liaison between JSC and DoD.

Operations Control Centers

The Secretary of Defense in 1979 had authorized development of the Consolidated Space Operations Center (CSOC). It would consist of two parts, the Satellite Operations Complex (SOC) and the Shuttle Operations and Planning Complex (SOPC). The SOC would be used for on-orbit control of DoD satellites, and the SOPC for planning and control of DoD Shuttle missions.

Prior to the activation of CSOC, DoD was using various NASA facilities (the Johnson and Kennedy Space Centers, and the Marshall and Goddard Space Flight Centers) to perform Shuttle mission control, but that approach had a serious deficiency: NASA centers were not designed for controlling classified missions, and could not be well adapted to that purpose. DoD therefore needed its own secure missions operations center for those classified payloads.

The Air Force also performed satellite control functions at the Air Force Satellite Control Facility in Sunnyvale, California (at the Onizuka AFS, the renamed Sunnyvale AFS). This location suffered several drawbacks, however. It was vulnerable to sabotage or attack; it was overcrowded, and

was near earthquake fault lines. A replacement or backup location was badly needed; this need was used as partial justification for CSOC's development.

CSOC was placed at Falcon AFS, near Colorado Springs, Colorado. It was also near the Cheyenne Mountain Complex, location of the Space Defense Operations Center of the Air Force Space Command. SD was charged with developing and building the CSOC, including facility and communications design, system support, training and network control. The Center would be assigned operationally to Space Command upon completion. SD further managed the development of plans needed to incorporate the center into the satellite control network.

CSOC's development was fraught with funding and initial definition problems. SOPC, the Shuttle control facility, was especially problematic. Early funding estimates had to be revised when increased technical definition required more money for implementation. The Air Staff had attempted to control costs by developing a program through an Intercommand Working Group. In Autumn 1982, the Group unfortunately found requirements that were far in excess of the budgeted funding for CSOC. Space Division responded to the pending increases by defining a program of development that built up capabilities in increments and offered a level of operational capability costing no more than the budgeted amount. The SD program was harshly constrained by financial realities. That December, the Under Secretary of the Air Force approved the reduced program, but directed that program managers preserve the options to restore certain desirable elements that had been excluded for fiscal reasons. The main desirable but unfunded elements were direct Shuttle control capabilities (rather than routing that control through NASA) and expanded satellite control abilities.

Planners had designed the SOPC to be the DoD equivalent of the Johnson

Space Center's Shuttle control facilities. Since those facilities were being upgraded, designs changed and the estimates of SOPC's cost grew. It was clear at the beginning of FY 1984 that without more money the SOPC would not be able to meet its directed schedule. The Air Staff decided in mid-year to change the schedule rather than supply additional funding. This action delayed the SOPC's ability to conduct flight planning until at least 1987, and to control its first mission until at least 1992. It also resulted in higher total costs for the SOPC. In response to the funding cuts and delays, the Program Office restudied the requirements for the SOPC and grouped them into operational capabilities ranked in order of priority. Development of the SOPC along this revised order of priorities would allow it to evolve in an orderly fashion to its full operational capability, albeit over a longer period of time.

The Satellite Operations Complex (SOC) was designed to control the Air Force's on-orbit operational satellites. It would also provide backup to the Air Force Satellite Control Facility, which would control the Air Force's R&D satellites. Negotiations with Space Command over the exact allocation of responsibility for satellite control resulted in additional design requirements for the SOC. This increased Space Command duty meant greater development costs and responsibilities for SD, since it changed the SOC's satellite control architecture. It also delayed efforts to place the SOC and the communications effort on contract, since new requirements had to be written. By the end of FY 1984, these programmatic changes had resulted in the slippage of initial satellite control operations until 1987.

Security issues at Kennedy and Johnson Space Centers and at Goddard and Marshall Space Flight Centers became a significant concern during this period. Classified DoD payloads would be carried by the Shuttle even

though the DoD facility at CSOC would not be ready for several years. It was therefore necessary to provide secure facilities at KSC, JSC and GSFC. These facilities would allow the centers to operate in what was known as the "Controlled Mode" during classified missions. As the delays at CSOC development grew, so did the cost of implementation of security measures at NASA's centers.

Expendable Launch Vehicles

During this period, DoD's expendable launch vehicles included the Thor, Scout, Atlas, and Titan. The Scout was a solid fuel rocket of either four or five stages. The Thor and its NASA-managed derivative the Delta were two-stage, liquid-fuel rockets that would frequently use strap-on rocket motors. The Atlas was a liquid-fuel rocket with two booster engines and one sustainer engine. The Titan III was a two-stage, liquid-fuel rocket, produced in three different versions, two of which used strap-on solid rocket motors.

Thor usage was phased out during FY 80, when SD determined that it was no longer cost effective to maintain that vehicle in its inventory. It had been used to launch satellites for the Defense Meteorological Satellite Program (DMSP), but the final Thor launch (14 July 1980) resulted in the destruction of the DMSP payload shortly after takeoff. Other technical problems, ranging from insufficient power to boost the larger satellites to inadequate launch facilities, eventually moved the Thor payloads to the Atlas booster. The remaining eleven Thors were stored at Norton AFB. By the end of FY 1981, funding for the Thor booster program ended and its launch facilities at Vandenberg AFB were deactivated. NASA managed the Thor derivative, the Delta, and was still using it at the end of this

period.

The Scout was used solely for DoD missions, except for one launch from San Marco Platform (off Kenya). This launch was supervised by the Italian government, with assistance from NASA. NASA managed the Scout program, but during FY 80 had attempted to turn over management of the program to the Air Force. Space Division resisted this attempt, and offered a compromise to NASA: in return for their continuing management of the Scout, the Air Force and specifically Space Division would maintain its management of Atlas boosters for NASA programs, and would use the Space Shuttle for payloads currently supported by the Scout program, after a set number of further Scout launches. NASA agreed to this suggestion. The Scout was also used to launch the Navy's TRANSIT/NOVA satellites, the interim program until Space Division's Global Positioning System became functional in the 1990s. By the end of FY 1984, NASA intended to commercialize the Scout program as soon as it could.

The Atlas booster originally had been designed as an ICBM. After being retired from service as ICBMs in the mid-1960s, the Atlas missiles were converted into space launch vehicles, since it was more economical to refurbish a fifteen-year-old Atlas than to develop a new booster. Following a failure of an Atlas MA-3 engine, SD embarked on a program to overhaul the remaining ones. Another effort to improve Atlas reliability included an upgrade of its computer-generated guidance system. During FY 1982, Space Division produced a new version of the Atlas launch vehicle known as the Atlas H. The Atlas was compatible with more upper stages than any other booster, using the Centaur, the Agena and the Stage Vehicle System.

The Titan family, the most powerful of all the boosters, had several models during this five-year period. All except one used the standard core

of the Titan III. The IIIB was a lengthened standard Titan with an Agena upper stage. The IIIC had two strap-on solid rocket-motors and a Transtage upper stage; it put payloads into very high orbits. The IIID also used two strap-on motors, but had no upper stage; it placed heavy payloads into low earth orbits. The Titan III (34)D was developed as an adjunct to the Space Transportation System, as the Air Force prepared for the transition to what ultimately became the mixed fleet concept of expendable launch vehicles and the reusable Shuttle vehicle. It would serve both as a stand-alone expendable (with or without upper stages), and as a transition vehicle to the Shuttle, as it came to replace both the Titan IIIC and IIID. A variety of Air Force programs had payloads on the Titans IIIC, IIID and 34D. The last Titan IIIC was launched in March 1982, and the last IIID was launched that November. The 34D began carrying payloads previously borne by IIIC and IIID. The Titan IIIB, launched only from the Western Test Range, was still in use at the end of FY 1984.

The Titan II was configured differently from the various Titan IIIs. It had begun as an ICBM, like the Thor and Atlas before it. In 1982, the Air Force contemplated using this missile as its newest launch vehicle, but funding problems delayed its refurbishment until FY 1984. During that year, the proposal received active support from the Office of the Secretary of the Air Force.

NASA viewed this development with alarm. One of the major customers for the upgraded Titan II was the NOAA program, currently launched by NASA, and therefore a potential customer for the Shuttle program. However, the Office of Management and Budget encouraged NOAA's inclination to use the cheaper Titan II, and directed NOAA to configure its satellites in accordance with DMSP specifications, using expendable launch vehicles.

Space Division's DMSP satellites were leading candidates for the refurbished Titan II.

The major developmental effort during the period was the Complementary Expendable Launch Vehicle (CELV--it would later re renamted the Titan IV). Near the end of FY 1983, Space Division had briefed the Air Force Vice Chief of Staff on the comparative costs of putting a payload into space by developing an expendable launch vehicle vs. using the existing Shuttle. A joint briefing presented by SD and the Space Command convinced the Under Secretary of the Air Force of the need to plan for concept definition of a new procurement of expendable launch vehicles. Under Secretary Aldridge proposed the innovative procurement procedure of using a commercially-procured CELV rather than standard Air Force development. The contractor would develop and launch the new ELV using his own money, and the Air Force would pay for using it. The contractor would recover his development costs in launch fees later. Congress reacted negatively to the proposal, however, and the Air Force abandoned the idea. It would attempt instead to obtain traditional governmental funding of development and launching.

NASA reacted strongly against the proposed CELV, suggesting that support for such a vehicle might undercut the Shuttle. The Air Force countered that reliance on the Shuttle alone was impractical, since a generic problem could ground the orbiters for extended periods. Such a grounding could delay critical payloads for extended lengths of time while experts attempted to give the Shuttle the reliability required by a manned vehicle. The CELV could launch those payloads more quickly, since it was unmanned and did not require such a high level of reliability.

The proposed vehicle's name was changed from Commercial Expendable Launch Vehicle to Complementary Expendable Launch Vehicle in order to

underscore its relationship to the Shuttle. NASA ultimately submitted its own concept for the CELV, based on Shuttle components. Since such a submission could be construed as competing with commercial contractors, the Air Staff directed that NASA's bid should be evaluated as a government alternative only after a commercial source had been selected.

Of the five upper stages used by Space Division, three were liquid fueled: the Centaur (used with the Atlas booster), the Transtage (used with the Titan III) and the Agena (used with both the Titan III and the Atlas). Two were solid-fueled: the Delta (used with NASA's Delta booster only, and not considered herein), and the Stage Vehicle System (used with the Atlas booster).

The Stage Vehicle System assisted the Atlas booster in placing the Global Positioning System's NAVSTAR satellites into orbit, and was developed specifically for that program. Newer, heavier satellites demanded a second stage with greater power; in 1979 SAMSO* had begun the design process for the new Space Guidance System Block II (SGS-II) Stage Vehicle System. Minor, correctable problems were dealt with, but a major problem surfaced in the propulsion system of the SGS-II, the Star 48 motor. NASA joined SD in its concern since its Propulsion Assist Module-D (PAM-D) also used the Star 48 motor. A joint NASA/Air Force investigation suggested possible solutions, which the contractor, Thiokol Corporation (subcontracted to McDonnell Douglas) attempted to implement. However, more problems cropped up, resulting in launch delays for both the Air Force and NASA. The major problem was a wobbling motion, "coning" or "nutation," which required the design of a control system to compensate for it. The nutation control system held the coning problem within acceptable limits during further testing. This success resulted in the first flight of the Star 48 motor in

July 1983. However, new problems surfaced shortly thereafter. Two separate Star 48 motors malfunctioned, and made their commercial payloads unusable. Subsequent investigation reassured Space Division of the usability of its particular motors, and later launches were successful. However, the decision had been made already to phase out the SGS-II in favor of the PAM-DII upper stage, which used Thiokol's Improved Performance Space Motor (IPSM). Because of this phase out, SD would employ only two more Star 48 motors, both of which were subjected to rigorous testing before use.

The development of the Shuttle affected overall mangement decisions during this period. The Air Force decided to transition to the Shuttle with the Titan (34)D, an expendable booster heavier than previous vehicles. When this booster needed an upper stage, the IUS was its initial mate. (See above.) It was also flown with the Transtage, already developed for use with the Titan IIIC, and capable of lifting high priority satellites into geosynchronous orbits. The initial launches of the Titan 34D/Transtage successfully occurred in 1984.

The Department of Defense ordered a new version of the Centaur configured for the Space Shuttle during FY 1982. A high energy upper stage was needed to place heavier-weight satellites into higher orbits than could be attained by the IUS. Development had been uncertain because the Air Force viewed the Centaur as competing with the IUS for funding. DoD however decided to support the Centaur's development after it had discovered a need for such launch capabilities beginning in the late 1980s. Two versions of the Centaur were to be developed; one for the DoD, and another for NASA. The DoD version would not need as much liquid fuel, since it would not be used for interplanetary missions, and would be somewhat shorter. Both configurations could be supported in the Shuttle's cargo bay. The Air Force

and NASA initiated a joint Centaur development program, with NASA performing the bulk of management activities.

Satellite Systems

Launch vehicles like the Titan III and ground facilities like CSOC were needed to put satellites into orbit and control them once they were there. Successful deployment of satellites therefore was the raison d'etre for most of Space Division's activities, and satellite systems were arguably Space Division's most important products. These systems were procured by program offices assigned to the Deputy Commander for Space Systems. They served several basic missions, including communication, navigation, weather reporting, and experimentation.

Space Division procured satellites for four space-based communications systems during this period: the Defense Satellite Communicatons System, the Fleet Satellite Communications System, MILSTAR, and the NATO Integrated Communications System. The Defense Satellite Communications System (DSCS) provided high data rate, worldwide, long-distance communications service to the Department of Defense and other federal agencies. The system consisted of satellites and earth terminals. An initial series of satellites had been launched in the 1960s, and a second series, DSCS II, had been introduced in the 1970s. DSCS II satellites carried communications payloads operating at super high frequency (7-9 Gigahertz). Each payload utilized two wide-beam horn antennas and two narrow-beam dish antennas. The horn antennas provided coverage of the entire portion of the earth's surface visible to the satellite, while the dish antennas, which were steerable by ground command, provided intensified coverage of small areas of the earth's surface and made it possible to use small, portable ground terminals within those areas.

Twelve DSCS II satellites had been launched between November 1971 and December 1978; eight had attained orbit and the other four had been lost due to booster failures. Three more DSCS IIs were successfully launched during the period covered by this chronology--two in November 1979, and one in October 1982. One more DSCS II satellite remained on the ground, available for launch, as the period ended.

While DSCS II satellites remained in service through the end of FY 1984, they were due to be replaced by a new generation of satellites called DSCS III. The DSCS III satellites were larger and heavier than their predecessors, and had a projected design life of ten years rather than five. The communications subsystem of the DSCS III provided six communication channels--DSCS II only provided four--and the antenna subsystem carried multiple beam antennas as well as horn and dish antennas. These multiple beam antennas allowed DSCS III to provide more flexible coverage than DSCS II, and gave it great resistance to jamming. With these additions and improvements, DSCS III satellites were better able to meet uniquely military needs than any previous communications satellites. A contract for development of the DSCS III satellite had been awarded to General Electric in February 1977. The contract had covered the fabrication and test of a qualification model satellite and two flight model satellites. The first DSCS III flight model satellite (III-A1) was successfully launched on 30 October 1982. It was placed in operation on 1 May 1983, following a lengthy period of on-orbit testing. Meanwhile, a contract for the production of four more DSCS III satellites had been awarded to General Electric in late 1982.

The Fleet Satellite Communications System (FLTSATCOM) provided communications for the Navy, the Air Force, and the DoD. Each FLTSATCOM

satellite provided 23 communication channels. One channel had a super high frequency uplink, and an ultra high frequency downlink; the others operated entirely in the ultra high frequency band. The Navy used ten channels for command and control of the fleet, and for communication among various elements of the fleet, including surface ships, submarines, and aircraft. The Air Force used twelve channels for command and control of the strategic nuclear forces--including both aircraft and missiles--and for communicaton among the commanders-in-chief of those forces. These twelve channels were part of the Air Force Satellite Communications System (AFSATCOM). The one remaining channel in the FLTSATCOM satellite was reserved for the National Command Authority. The contractor for FLTSATCOM was TRW, and the initial buy consisted of five satellites. The first two had been launched in 1978 and 1979, and two more were launched in January and October of 1980. All these launches were successful, but the fifth launch, on 6 August 1981, was not. Two minutes into the launch, the satellite received a severe shock and was so seriously damaged that it never became operational. The orbital constellation was not immediately affected by this loss, because the other four satellites continued in operation through the end of FY 1984. To replenish the constellation when those satellites did fail, however, Space Division ordered three more FLTSATCOM spacecraft from TRW in June 1983.

FLTSATCOM was to be succeeded by a new satellite system called MILSTAR. MILSTAR was to provide a worldwide communications capability that would be highly jam-resistant, survivable and enduring. Such a high degree of survivability would be achieved through the use of extremely high frequencies and other advanced techniques. Space Division awarded concept validation contracts for the satellite and mission control segment of MILSTAR in March 1982, and in February 1983, it selected Lockheed Missiles

and Space Company to carry the program into full-scale development. The full scale development contract was awarded in July 1983.

In addition to developing and producing communication satellites for American military needs, Space Division also procured communication satellites for the North Atlantic Treaty Organization (NATO). These efforts had been initiated by Space Division's predecessor, SAMSO, and had culminated in the NATO III program. The NATO III satellite carried three antennas--a wide-beam receive antenna, a wide-beam transmit antenna, and a narrow-beam transmit antenna--and provided three super high frequency communication channels. Three satellites--NATO IIIA, IIIB, and IIIC--had been launched between 1976 and 1978. The program had been phased out in 1979, but in 1980, NATO decided to procure an additional satellite, NATO IIID, to replenish the constellation. A letter contract for production of this satellite was awarded to Ford Aerospace and Communications Corp. in December 1980, and a definitive contract was signed the following July. NATO IIID was successfully launched on 13 November 1984, just after the end of the period covered by this chronology.

Space Division's role in the acquisition of space-based communication systems was limited mainly to the procurement of satellites; the terminals for those systems were procured by other agencies. When it came to space-based weather and navigation systems, however, Space Division procured not only the satellites, but also the ground hardware that complemented them. During this period, Space Division was involved with one space-based weather reporting system--the Defense Meteorological Satellite Program--and one space-based navigation system--the Global Positioning System.

The Defense Meteorological Satellite Program (DMSP) provided space, ground and shipboard hardware to collect and disseminate weather data. The

space segment of the system consisted of two satellites in 450-nautical-mile, sun-synchronous, polar orbits. Each satellite carried a primary sensor that collected visible and infrared imagery of cloud cover on the earth's surface, as well as various mission sensors that collected other types of meteorological data. Command and control of the satellites was exercised by a Satellite Operations Center at Offutt AFB, Nebraska, assisted by Command Readout Stations at Loring AFB, Maine, and Fairchild AFB, Washington. Weather data from the satellites was received by the Command Readout Stations and by tactical terminals deployed all over the globe. The tactical terminals received real-time data on local weather conditions, while the readout stations received stored (tape recorded) data on weather conditions around the world. The stored data was relayed to the Air Force Global Weather Central, at Offutt AFB, Nebraska, and to the Navy's Fleet Numerical Oceanography Center in Monterey, California, where it was analyzed. RCA was the contractor for the spacecraft, Westinghouse for the primary sensor, and Harris Corp. for the ground terminals and the command and control system.

During this period, DMSP was moving from an older type of weather satellite, the Block 5D-1, to a newer type, the Block 5D-2. The two models were basically similar, but the 5D-2 was larger and heavier, and it incorporated various improvements designed to give it a longer life expectancy and increase the quantity and usefulness of its weather data. As of 1 October 1979, the orbital constellation consisted of three Block 5D-1 satellites. However, one of these suffered a partial failure in December 1979, and the other two failed completely during 1980. A replenishment satellite was launched in July 1980, but it did not attain orbit. Since this was the last Block 5D-1 satellite in the inventory, the next

replenishment launch could not occur until the first Block 5D-2 satellite came off the production line. Several delays held up the launch: the satellite was not delivered as scheduled, the Atlas booster that would launch it was late in arriving, and the activation of a new Satellite Operations Center that was needed to support the Block 5D-2 satellites in orbit was postponed. Finally, however, all the necessary elements were in place, and the first Block 5D-2 satellite was successfully launched on 20 December 1980. The second Block 5D-2 followed it into orbit on 17 November 1983, restoring the DMSP space segment to fully operational status. Space Division ordered seven more 5D-2 spacecraft from RCA between 1980 and 1983, and one of those was delivered in March 1984.

The Global Positioning System (GPS) consisted of satellites that broadcast navigation signals to earth, a control segment that monitored the satellites and sent commands to them, and receivers that picked up signals from the satellites and allowed users to determine their position and velocity. When the system was fully operational, the receivers, called user sets, would be installed in a wide variety of aircraft, ships, submarines, and armored vehicles, and would be available to foot soldiers as well. The system would be able to support a wide range of specialized applications, including enroute navigation on land, at sea, and in the air; precision weapons delivery; aircraft runway approaches; aerial rendezvous and refueling; photomapping; geodetic surveys; updating of missile navigation systems; and search and rescue operations.

GPS was Space Division's newest satellite program, and was being acquired in three phases--concept validation, full-scale development, and production. During the validation phase, initiated in 1973, a small constellation of prototype (Block I) navigation satellites and a prototype

control segment had been deployed, and advanced development models of various types of user equipment had been built and tested. During the development phase, whch began in 1979, additional Block I satellites were launched to replenish the constellation, and prototype user equipment was obtained from two competing contractors, Rockwell International and Magnavox. Field testing of the prototype equipment started in January 1983, and the results would determine which of the two contractors would be selected to build user equipment during the production phase. The production phase would also involve the deployment of a full constellation of 18 operational (Block II) navigation satellites and support of those satellites by an Operational Control Segment. In September 1980, Space Division awarded IBM a contract to design and develop the Operational Control Segment, and in May 1983, it awarded Rockwell International a multi-year contract for the fabrication of 28 Block II satellites. The Rockwell contract had a dollar value of $1.21 billion--the highest dollar value of any satellite contract ever awarded--and was the first multi-year procurement of production-model satellites by the DoD. The multi-year buy was considerably less expensive than would have been the traditional series of annual buys. Deployment of the full satellite constellation, the Operational Control Segment, and production-model user equipment was expected to give GPS a full operational capability by the late 1980s.

GPS acted as a platform for sensors that detected nuclear detonations (NUDETS). NUDET sensors were incorporated into operational GPS satellites beginning with NAVSTAR 8, launched in July 1983. During the same month, Space Division awarded Texas Instruments a contract to develop Ground/Airborne Integrated Terminals (G/AITs), which would handle the NUDET data

In addition to building hardware for the satellite systems described above, Space Division was involved with experimental space payloads that did not form part of any system. The Space Test Program, managed by Space Division, provided space flights for experimental payloads sponsored by DoD Agencies. Some of those payloads reached orbit by flying piggy-back on boosters or spacecraft assigned to other programs. Others were integrated into large, free-flying spacecraft of their own, and were carried into orbit by their own booster or by a Shuttle flight devoted largely to them. Still others went into orbit on board the Shuttle, were operated from the Shuttle in a sortie mode, and were brought back to earth by the same Shuttle flight. One payload in the second category was Teal Ruby, which was an infrared mosaic sensor that would demonstrate detection of aircraft in flight. Teal Ruby was to be integrated into a spacecraft called AFP-888, and the resulting satellite was so large and complex that a separate program office was set up in Space Division to manage acquistion of it. Rockwell International was the contractor for both the payload and the spacecraft. Problems and delays caused the launch of AFP-888/Teal Ruby to slip beyond the period covered by this chronology.

Special Programs

There were two special programs at Space Division during this period that did not fit into either the category of launch vehicle or satellite. They marked a philosophical departure for military space activity for the United States. Heretofore, space technology had been aimed at gathering or relaying information only. The AntiSatellite Program and the Strategic Defense Initiative gave notice that American space technology possessed the conceptual capabilty to use space as a theater of war. These programs

further signaled an American intention to place defensive weapons into orbit. They were designed to provide a response to an enemy satellite or intercontinental ballistic missile by destroying the weapon while it was still in space.

As its name indicates, the AntiSatellite Program (ASAT) was designed to shoot down threatening enemy satellites. It featured a miniature vehicle warhead system that was launched by an F-15 aircraft, and was boosted into orbital altitudes by a missile-style booster. It was still in its developmental phase during this period; several captive flights were performed, and the first free flight was accomplished in 1984.

The Strategic Defense Initiative (SDI) Program grew out of DoD's response to President Reagan's National Security Decision Directive 85, issued on 25 March 1983. The directive called for definition of a long-term research and development program to eliminate the threat of nuclear ballistic missiles. OSD's study of technologies which might contribute to ballistic missile defense was carried out by a large team of experts known as the Defensive Technology Study Team (DTST). The team's technology development recommendations, issued in October 1983, became known as Strategic Defense Initiatives; this name was finally transferred to the entire DoD response to NSDD-85. OSD began to assign responsibilities for the programs to its services and agencies in November of that same year. The following March, it anounced the appointment of Lt Gen James A. Abrahamson as the director of its SDI Organization (SDIO). The SDIO provided centralized program direction and budgetary control from the level of OSD to the individual technology development programs carried out by the Air Force, Army, Navy, DARPA, DNA and DoE.

Space Division became involved in the SDI Program early in the planning

process. It provided or coordinated most of AFSC's and the Air Force's contribution to the DTST as well as to an independent Air Force technology assessment known as the Defense Against Ballistic Missiles (DABM) study. On 28 November 1983, AFSC assigned integration management of DABM efforts to Space Division, and on 5 June 1984, it designated Space Division as Integrating Product Division (IPD) for SDI tasks assigned to AFSC. As IPD, Space Division coordinated SDI efforts by all AFSC field organizations, assigned SDI tasking, tracked budgets and expenditures, and generally managed the overall SDI efforts of AFSC.

AFSC also designated Space Division as Lead Product Division (LPD) for most Air Force SDI programs. As LPD, Space Division was responsible for the execution of four of the Air Force's five technical efforts: 1) Surveillance, Acquisition, Tracking and Kill Assessment (SATKA); 2) Directed Energy Weapons (DEW); 3) Kinetic Energy Weapons (KEW); and 4) Survivability, Lethality, and Key Technologies (SLKT). The fifth element (Battle Management, C^3/Systems Analysis) was managed by the Electronic Systems Division of AFSC, with SD execution of the Threat, Systems Analysis portion of that task.

The largest SATKA programs involved space-based surveillance and tracking systems for targets in different portions of the ballistic trajectory. DEW programs involved laser weapons sytems, both space-based and ground-based, and particle beam systems. KEW programs included space-based kinetic kill vehicles and eletromagnetic launchers. SLKT programs included countermeasures of various kinds, space logistics (including launch vehicles), and lethality studies. BMC^3/SA programs included architecture, threat, and systems analysis studies. Some of these programs were managed directly by program offices at HQ SD, while others were managed by the Air

Force Space Technology Center and its laboratories.

The Air Force spent somewhat over one third of SDI's total budget; Space Division was responsible for managing the bulk of those funds. Manpower resources were more difficult to track, since the program drew its manpower from already existing offices. New offices were created to liaison with SDIO and other DoD agencies active in the effort, and to manage the new programs being developed. Space Division in general attempted to build up the manpower to match the increased management tasks of SDI.

The five years covered by this chronology witnessed Space Division's participation in the development of new programs combined with the ongoing processes involved in managing existing programs. Major challenges were faced in the Space Transportation System, the Strategic Defense Initiative program, and the several troubled developmental programs, most notably the Inertial Upper Stage and the Global Positioning System. Human concerns occupied much of the attention of administrators, confronted with the need to accomplish greater tasking with reduced personnel. "Doing more with less" had become a way of life for Space Division. As the period ended, the organization continued to perform its mission: planning and building military space systems on the cutting edge of technological development.

CHRONOLOGY

1 October 1979 - 30 September 1984

FY 1980

October 1979 — Phase I of Shuttle launch pad construction was completed at Vandenberg AFB. Phase I involved excavation and demolition work to prepare the site.

October 1979 — Contract go ahead was given for installation of Integrated Operational NUDET Detection System (IONDS) payloads on GPS satellites 9, 10, and 11. An IONDS payload was already being integrated into GPS satellite 6, refurbished qualification model. Once in orbit, these payloads would detect nuclear detonations(NUDETs).

1 October 1979 — The Space and Missile Systems Organization (SAMSO) was divided into two new organizations--Space Division (SD) and the Ballistic Missile Office (BMO). At the same time, the Space and Missile Test Center (SAMTEC) was redesignated as Space and Missile Test Organization (SAMTO); and the Eastern Space and Missile Center (ESMC) and the Western Space and Missile Center (WSMC) were created and assigned to it. ESMC included the former 6555th Aerospace Test Group, the 6550th Air Base Wing, and Detachment 1 of SAMTEC.

1 October 1979 — Employees at Los Angeles AFS were permitted to adopt flexible work schedules.

1 October 1979 — A Titan IIIC booster was launched successfully from Cape Canaveral AFS, Florida.

1 October 1979 — In response to IUS propulsion problems that had turned up in FY 1979, Space Division formed a "Tiger Team" to investigate technical and management concerns about manufacturing processes and to assess their impact on the IUS schedule.

8 October 1979 — A balloon carrying two mosaic sensors was successfully launched from Keesler AFB, Mississippi, as part of the Balloon Altitude Mosaic Measurements Program. The balloon rose to an altitude of 100,000 feet and measured the infrared radiation emitted by the earth. These measurements would assist Space Division in developing a mosaic sensor for missile surveillance purposes.

10-12 October 1979 — The initial preliminary design review was held for

	the Controlled Mode at Johnson Space Center (JSC). The Controlled Mode would protect classified information that would have to be handled at JSC when the space Shuttle was used for classified DOD missions.
16 October 1979	A Joint Service Support Management Plan for GPS received final approval. The plan made Space Division's GPS Program Office the single manager, responsible for planning, management, and budgeting activities until the system was developed and management responsibility was transferred to AFLC. Subsequently, management would be centralized in a Joint Service System Management Office to be located at Warner Robins Air Logistics Center. Any subsequent changes to the satellite which affected the control or user segments would have to be approved by the JSSMO.
27 October 1979	The IUS's large solid rocket motor skirt was successfully tested.
30-31 October 1979	A successful critical design review (CDR) was held on the Space Guidance System Block II (SGS II) Stage Vehicle System, an upper stage being developed for the GPS program by the McDonnell Douglas Astronautics Company.
31 October 1979	A critical design review was held for the Lasercom Space Measurement Unit (LSMU). The LSMU was to be a wide angle, multiple access receiver capable of receiving messages from several sources at once. It would be flown in space to demonstrate the feasibility of low data rate laser communication between airborne and ground terminals and a spacecraft.
31 October 1979	Space Division awarded Rockwell International a contract a contract for GPS satellites 9 through 12, at a price of $86.2 million. Originally, all four were to be Block I replenishment satellites, but it was later decided that GPS 12 would be the qualification test vehicle for GPS Block II satellites.
November 1979	A Schedule Assessment Team estimated that launch of the first DSCS III flight model satellite would slip from mid-1980 to January 1981. The following month, the DSCS III Program Office estimated that the launch would probably not occur until June 1981.
November 1979	Lt Gen Richard C. Henry, the Commander of Space Division, proposed the establishment of the Deputy Commander for Space Operations.

November 1979	NASA decided to augment the thrust of the Space Shuttle by attaching a liquid boost module to it. The module, proposed by Martin Marietta and Aerojet, would use Titan III engines and modified hardware. Some type of thrust augmentation was thought necessary because estimates of the Shuttle's maximum payload weight had fallen below the original design estimates. NASA had therefore begun planning in 1978 to augment the Shuttle's thrust for certain heavy DOD missions. The decision to use a liquid boost module supplanted an earlier (1978) decision to attach two small solid rocket motors to the Shuttle's large solid rocket motors. The idea of thrust augmentation, however, was later abandoned.
13 November 1979	The IUS's small solid rocket motor skirt was successfully tested.
15 November 1979	The final increment of the critical design review of the two stage IUS vehicle was completed.
16 November 1979	A Presidential Directive was issued on the relationship between military and civilian weather satellite programs. The directive stated that military and civilian agencies could continue to maintain separate weather satellite systems, but they could not develop any new satellites for them until they agreed on a joint development and procurement program. Since the agencies were unable to agree on such a program, the directive forced Space Division to cancel plans for development of a Block-6 DMSP satellite.
20 November 1979	A Titan IIIC booster successfully placed DSCS satellites II-DI3 and II-DI4 into geosynchronous orbit.
28 November 1979	Beginning on this date, Los Angeles AFS personnel were charged $10 a month to park on base.
29-30 November 1979	Space Division's Deputy for Technology sponsored a Long Range Space Technology Planning Seminar with representatives of AFSC's Director of Science and Technology (AFSCDL). This seminar led to the formation of a Space Technology Planning Group composed of representatives from AFSCDL and Space Division's Director of Technology, Plans and Analysis. The group met three times during FY 1980 to discuss such technology initiatives as space-based radar, infrared mosaic sensor systems, advanced military spaceflight capabilities, and space-hardened electronics. These efforts constituted one of two major steps that Space

	Division took during FY 1980 to insure better communications with AFSC's laboratories on space technology planning. The other step was the initiation of the Military Space Systems Technology Model.
December 1979	Space Division's laser communications system was subjected to an interim flight test at the White Sands Missile Range in New Mexico. This interim test successfully demonstrated the ability of a laser communications unit on an aircraft to acquire and track a beacon from a laser receiver on the ground.
December 1979	A Critical Design Review was held for STP's P80-1 spacecraft. The primary payload for this space craft was the Teal Ruby experiment sponsored by DARPA.
December 1979	The President and the Secretary of Defense agreed to remove $512 million from the GPS budget for FY 1981 1985. The cut made it impossible to carry out the full scale development GPS program approved by the DSARC in June 1979. Space Division was directed to reduce the planned GPS constellation of 24 satellites to 18 and to recommend alternatives to deal with fewer resources.
1 December 1979	OAO Corporation was put on contract to develop a Flight Vehicle Simulator for the new DMSP Satellite Operations Center (SOC). The SOC would be used to command and control the new DMSP Block 5D 2 satellites. It also would include a mission planning element, a commanding element, and elements for processing real time and stored telemetry.
2 December 1979	DMSP satellite F-3 suffered a major anomaly when one or more integrated circuits failed and all data from its primary sensor became unusable. On 16 April, the sensor recovered to the point that it was able to provide some visual data, but it was never again able to provide any infrared data.
4 December 1979	For the first time, contractors were invited to a Solicitation Review Panel (Murder Board) to discuss a Request for Proposal before it was released.
5 December 1979	The first development firing of the IUS's small solid rocket motor was held successfully at the Arnold Engineering Development Center in Tullahoma, Tennessee.
6 December 1979	Gen Alton D. Slay, AFSC Commander, approved a revised IUS program baseline which delayed the IOC

to July 1981.

12 December 1979	Congress eliminated $12 million of research and development funds remaining in Space Division's mosaic sensor program, zeroing out the program. Space Division had to cancel the modest ongoing efforts by Grumman and Aerojet on mosaic sensors.
14 December 1979	Systems and Applied Sciences was put on contract to develop a Stored Telemetry Processing System for the new DMSP SOC.
19 December 1979	HQ USAF issueda program management directive requiring Space Division to "manage toward a cost threshold of $49.4M" on the Controlled Moce project at Johnson Space Center.
20 December 1979	Dr. Hans Mark, Secretary of the Air Force, announced the selection of Peterson AFB as the Air Force's preferred site for the Consolidated Space Operations Center (CSOC). Activation of the CSOC at Peterson, however, depended on a favorable environmental impact analysis and successful acquisition of real estate.
20 December 1979	The first development firing of the IUS's large solid rocket motor was held successfully at the Arnold Engineering Development Center in Tullahoma, Tennessee.
January 1980	The Emissions Inventory for STS facilities at Vandenberg AFB was completed. Completion of the Emissions Inventory was the first step in obtaining air quality control permits for the new buildings.
January 1980	A marine biological study and a boathouse stucy were completed as part of an overall effort to analyze the environmental impact of the Space Transportation System on Vandenberg AFB. Both studies focused on the Point Arguello area, where a shallow harbor would be built to receive barges carrying fuel tanks for the Space Shuttle. Construction of the harbor would disturb marine life and require destruction of a historic boat house.
January 1980	HQ USAF reduced FY 1980 funding for GPS from $182.6 million to $157.6 million.
4 January 1980	Design of the Vandenberg STS Launch Control Center was completed.
7 January 1980	The architectural engineering firm of Seeley, Stevenson, Value, and Knecht (SSV&K) began design work on the Shuttle Payload Integration Facility at

	Kennedy Space Center.
8 January 1980	Space Division's GPS Joint Program Office demonstrated GPS differential navigation using a helicopter at the Yuma Proving Grounds. The demonstration used a fixed GPS receiver in a precisely determined location to correct errors in a GPS receiver in a mobile unit. Using this method, the user set on the helicopter generated an average differential navigation accuracy of 7 meters.
17 January 1980	An Atlas/Centaur booster successfully launched FLTSATCOM satellite F-3 into orbit. The satellite was declared operational on 17 February.
22-24 January 1980	A Space Power Amplifier Workshop was held at Space Division. The workshop reviewed plans to improve the reliability of Traveling Wave Tube Amplifiers (TWTAs) used in communications satellites.
28 January 1980	A supplemental agreement was signed, putting the Vought Corporation on contract for Phase IB of the antisatellite (ASAT) program. The ASAT system under development would utilize an F-15 aircraft to launch a two stage missile. The missile would destroy its target with a warhead called the miniature vehicle.
29 January 1980	The Comptroller's Office was redesignated as Deputy for Comptroller.
30 January 1980	Design funds were authorized for a commissary at Los Angeles AFS, California.
February 1980	Installation of the second increment of the STS Control, Check out, and Monitor Subsystem (CCMS) at Vandenberg AFB was completed.
7 February 1980	A Titan IIID booster was launched successfully from Vandenberg AFB, California.
7 February 1980	A system design review was held on Ground Communications Network III, which was being developed for the Defense Support Program by Technology Development Corporation. The review generated 71 action items, and the contractor's performance was considered unsatisfactory.
9 February 1980	An Atlas booster successfully launched NAVSTAR 5 into a nominal orbit. The satellite became operational on 15 February 1980.
15 February 1980	The final increment of the preliminary design review of NASA's three stage version of the IUS was successfully held. This version had a spinning

third stage and was known as the planetary configuration.

17 February 1980 — DMSP satellite F-2 suffered a computer failure, as a result of which it lost attitude control and was declared non-operational.

25 February 1980 — Space Division and TRW completed negotiations on a contract for modifications to DSP satellites 5, 6, 12, and 13. The modifications incorporated improved sensors and survivability improvements. The effort had been initiated by a letter contract in June 1979. Negotiations had been protracted because of disagreements over the issues of negative incentives for poor performance and milestone billing. The definitized contract was distributed on 15 April 1980 after approval by AFSC. The value of the contract was $98,783,901.

27 February 1980 — A successful series of full launch duration tests was begun on the Space Shuttle's main engine.

March 1980 — HQ USAF reduced FY 1980 funding for GPS from $157.6 million to $140.0 million.

3 March 1980 — An Atlas booster was launched successfully from Vandenberg AFB, California.

4-5 March 1980 — A successful critical design review was held on a new sensor called the microwave imager. The Hughes Aircraft Company was developing this sensor for use on DMSP Block 5D 2 satellites. It would measure the intensity of precipitation over both land and water, measure sea surface temperatures through cloud cover, gather data on the roughness of the ocean surface so that the speed of surface winds could be inferred, measure the thickness and extent of sea ice, and measure the moisture content of the soil.

6 March 1980 — HQ USAF authorized Space Division to design the GPS Block II satellite for launch by the Payload Assist Module rather than the Inertial Upper Stage.

8 March 1980 — The second successful development firing of the IUS's small solid rocket motor was held at the Arnold Engineering Development Center in Tullahoma, Tennessee.

14 March 1980 — President Carter imposed a hiring freeze on the federal government.

18 March 1980 — Space Division definitized a letter contract covering production of two DMSP spacecraft (S-8 and S-9); and acquistion of long lead parts for a third

	(S-10). The contract, awarded to RCA, had a target cost of $38.2 million. On 13 March 1981, the contract was modified to provide for fabrication of the third spacecraft. The modification raised the value of the contract by $9.7 million.
18 March 1980	HQ USAF issued PMD 14 outlining a restructured program for GPS. PMD 14 specified that a constellation of 18 satellites was to be in place by FY 1988, though the system was to be "expandable" to 24 satellites. The system would achieve a three dimensional navigational accuracy of 16 meters at least 50 percent of the time. All future operational GPS satellites would carry an IONDS payload, and GPS satellites would use AFSATCOM single channel transponders beginning with NAVSTAR 12.
24 March 1980	Santa Fe Engineers of Lancaster, California, began construction of the Orbiter Maintenance and Checkout Facility (OMCF) at Vandenberg AFB, California.
April 1980	IBM was awarded a contract to develop new software for the Defense Support Program's Large Processing Stations. The software would make the ground stations compatible with an improved sensor to be flown on DSP satellites 5 and 6.
April 1980	The North Atlantic Treaty Organization decided to procure one or two additional NATO III communication satellites. On 5 June, Space Division established a program office to manage acquisition of these satellites.
April 1980	The alteration of the science labs in Building 130 was completed. The project introduced safety features required by the Occupational Safety and Health Administration.
17 April 1980	The second successful development firing of the IUS's large solid rocket motor was held at the Arnold Engineering Development Center in Tullahoma, Tennessee.
21-25 April 1980	A preliminary design review was held on the Satellite Data Handling System (SDHS), being developed for the DMSP program by the Harris Corporation. The government considered the preliminary design to be inadequate. The SDHS was a computerized weather forecasting system that was to be installed at the Air Force Global Weather Central at Offutt AFB, Nebraska.
23 April 1980	A contract for Phase II of Vandenberg Shuttle

	launch pad construction was signed with a consortium of Kasler Corporation, Continental Heller Corporation and Fruin Colnon Corporation.
26 April 1980	An Atlas booster successfully launched NAVSTAR 6 into a nominal orbit. The satellite became operational on 7 May 1980.
29 April 1980	HQ USAF authorized AFSC to launch the DMSP Block 5D 2 satellites on the Atlas rather than the Thor. This decision, which had been debated for some time within the Air Force, meant the elimination of the Blue Suit launch team that had launched the Thor. It did enable the DMSP program to avoid some serious practical problems associated with use of the Thor. The most serious problem involved high acoustic levels which Thor boosters, modified to launch the heavier Block 5D 2 satellites, would generate.
May 1980	Space Division directed Rockwell International, the prime contractor for GPS satellites, to award a subcontract to EG&G, Incorporated, to build two prototype rubidium clocks for the program. Previously, clocks for GPS satellites had been produced only by Rockwell's Autonetics Group. The subcontract was an effort to improve program confidence in the atomic clocks, which had suffered from reliability problems.
May 1980	Space Division requested contractor proposals for the Sortie Support System (SSS). The SSS included a pallet, a pointing system, and other equipment that would support experiments flown on the Shuttle in a sortie mode. In this mode, the Shuttle would both carry payloads into space and serve as a for them while they were in orbit.
1 May 1980	Pending DOD review, Lt Gen R.C. Henry, Space Division Commander, suspended the collection of parking fees at Los Angeles AFS.
1 May 1980	Space Division issued a contract to Ford Aerospace and Communications Corporation for concept analysis, development, and testing of transportable satellite ground terminals and other ground station/link survivability concepts. The portion of the effort dealing with transportable terminals eventually became the Transportable Mobile Ground Station (TMGS) program. Ford was to develop the TMGS in two steps: the first step would yield a validation model carried in two vans and a flatbed trailer; the second step would yield a demonstration model using miniaturized components carried in one van. Ford was to finish the effort

by September 1984.

5 May 1980 — Space Division awarded TRW a contract for the Laser Countermeasures Demonstration program. TRW was to develop information on the laser threat to space systems, define and develop countermeasures to defeat that threat, and design engineering hardware and computer models that would demonstrate the effectiveness of proposed countermeasures.

7 May 1980 — The contract for construction of the Vandenberg STS Launch Control Center was awarded to H.C. Smith Construction of Irvine, California.

9 May 1980 — The government sent the Harris Corporation a cure notice, criticizing the company's performance on the Satellite Data Handling System contract and directing it to correct its deficiencies. A second cure notice was sent on 18 July.

14 May 1980 — The third successful development firing of the IUS's small solid rocket motor was held at the Arnold Engineering Development Center in Tullahoma, Tennessee.

27 May 1980 — Martin Marietta began shake tests of the Control, Check out, and Monitor Subsystem (CCMS) equipment that was to be housed in the second floor firing room of the Vandenberg STS Launch Control Center.

29 May 1980 — NOAA 6, a National Oceanic and Atmospheric Administration weather observation satellite, was launched on an Atlas F booster. The booster malfunctioned and put the satellite into an orbit from which it could not carry out its observational functions.

June 1980 — A conference on space based radar and infrared air vehicle detection was held at Los Angeles AFS and was attended by DOD, Navy, Air Force Lab, major command and contractor representatives.

June 1980 — At Space Division's request, Rockwell transferred the Teal Ruby electronic board design work from Pactel to Rockwell Autonetics Division, and the Teal Ruby electronic board production work from Pactel to Lytronics Industries and Cirtel. Pactel had been unable to produce these items on schedule.

June 1980 — The SD Clinic moved from its old location near the airport to a new location at Los Angeles AFS.

June 1980 — The Air Force POM reduced GPS funding for FY 1982 from $234.5 million to $16.3 million. This action left only enough funds to maintain a test

constellation of 5 satellites. OSD subsequently modified the POM to give the GPS program $259.3 million in FY 1982.

June 1980 — The DSP office asked Lt Gen Henry to intervene in its problems with the Santa Barbara Research Center, a subsidiary of Hughes Aircraft Company. SBRC was far behind its delivery schedule for producing focal planes for an improved DSP sensor. Deliveries improved significantly when Hughes sent a new manager for the focal plane program to SBRC.

9 June 1980 — The Air Staff issued a program management directive at maintaining critical Titan III production capability until the Space Shuttle became operational on the east coast.

13 June 1980 — A preliminary design review was held for the Ground Communications Network III. The contractor's performance seemed to have improved since the unsatisfactory system design review of 7 February.

13 June 1980 — Gen Alton D. Slay, AFSC Commander, visited Space Division and discussed Space Division's proposed TMTA Product Improvement Program. As a result of the visit, outstanding issues were resolved, and AFSC approved the program.

16 June 1980 — Aerojet ElectroSystems received a contract to provide 15 new computers for the Defense Support Program's Large Processing Stations. Aerojet was to buy the computers from IBM and install them itself.

18 June 1980 — A Titan IIID booster was launched successfully from Vandenberg AFB, California.

19 June 1980 — Letter contracts were issued to Vought and Boeing, allowing them to start work on Phase 1C of the anti-satellite (ASAT) program. In phases 1A and 1B, Boeing had been a subcontractor to Vought, but in this phase the two companies were to be associate contractors. Phase 1C covered fabrication and flight testing of the prototype ASAT system. The Vought contract was later definitized with a target cost of $247.3 million and the Boeing contract had a target cost of $154.1 million. These sums were higher than expected, creating a severe funding problem for the ASAT program.

July 1980 — The Westinghouse Electric Company delivered the first Operational Linescan System (OLS) configured for use in a DMSP Block 5D-2 satellite. The OLS was the primary sensor flown on DMSP satellites; it

	provided visual and infrared imagery of cloud cover on the earth's surface.
July 1980	Space Division and NASA's Marshall Space Flight Center signed a new management plan detailing the areas in which each would review and approve the development programs affecting its own versions of the IUS.
July 1980	The Air Force delivered its Proposed Draft Environmental Impact Statement on the Consolidated Space Operations Center to the Environmental Protection Agency.
1 July 1980	NAVSTAR 2 was declared non-operational because of the failure of its atomic clocks.
1 July 1980	Space Division began working on the Mission Utility and Functional Survivability Analysis Program, a general study of space sensor systems.
7 July 1980	Space Division exercised a contract option to purchase the first flight model microwave imager for the DMSP program.
11 July 1980	The government accepted a prototype version of the Mark IV transportable terminal, developed for the DMSP program by the Harris Corporation. The first two production units of this terminal were delivered in August and September. Mark IV terminals received and displayed real time weather data from DMSP satellites.
14 July 1980	DMSP satellite F-5 was launched from Vandenberg AFB on board a Thor booster. All telemetry was lost nine seconds after the third stage ignited, and the satellite failed to attain orbit.
25 July 1980	The DSCS III qualification satellite entered system level testing.
31 July 1980	The parking fee program was officially discontinued at Los Angeles AFS.
August 1980	The House and Senate Armed Services Committees agreed to delete funding for the Strategic Satellite System (SSS) from the FY 1981 budget. This was the third year in a row that Congress had refused to fund the program.
August 1980	Formal flight testing of Space Division's laser communications system got underway at the White Sands Missile Range in New Mexico. This formal test demonstrated the ability of a laser communications unit on board an aircraft to

	transmit data at high rates to a laser receiver on the ground.
August 1980	At NASA's request, Space Division implemented Boeing's proposal for a three-axis control system for NASA's three stage IUS.
1 August 1980	HQ AFSC initiated a Space Based High Energy Laser Mission Applications Evaluation. The objective was to determine the mission for a space-based laser system and the time to start developing that system. The evaluation was later integrated into a larger study initiated by the DOD in response to a Congressional request. The larger study was designed to provide Congress with information on the feasibility of accelerating the development of space based laser systems and a plan for the earliest feasible on-orbit deployment of such a system.
4 August 1980	A preliminary design review was held on prototype user equipment that Rockwell Collins was developing for the GPS program. Rockwell was one of two contractors developing such equipment; the other was Magnavox.
5 August 1980	A special panel began a broad, in-depth review of the DMSP program at the request of General Slay, AFSC Commander. The review was triggered by a series of misfortunes that had befallen the DMSP program, the latest of which was the launch failure of 14 July 1980. The results of the review were briefed to General Slay on 16 September.
8 August 1980	DMSP satellite F-4 was declared non-operational after six of its 17 battery cells had failed. Failure of the battery cells led to failure of the computer, which caused the satellite to lose attitude control.
13 August 1980	The third successful development firing of the IUS's large solid rocket motor was held at the Arnold Engineering Development Center in Tullahoma, Tennessee.
18 August 1980	The Air Force Geophysics Lab successfully launched a rocket probe to take infrared background measurements in support of Space Division's Background Measurements Probe (BMP) program. The probe carried a radiometer that measured infrared radiation from interplanetary dust.
29 August 1980	HQ USAF directed Space Division to begin development of near-term space-based radar.

September 1980	Space Division decided to sponsor the Jet Propulsion Laboratory's Autonomous Spacecraft Project.
September 1980	The Nunn-Warner Amendment containing a Variable Housing Allowance for military personnel was signed by the President. The Variable Housing Allowance would channel extra money to personnel assigned to areas like Los Angeles where housing costs were high.
1 September 1980	The Deputy Commander for Space Operations was established.
8 September 1980	HQ USAF issued PMD 15 for GPS, which directed the inclusion of an IONDS payload on GPS satellites, a third selective availability technique to deny unauthorized users access to the more precise positioning code, and the exclusion of the AFSATCOM single channel transponder which had been mandated by PMD 14.
10-11 September 1980	HQ USAF hosted a working group meeting for the members of the Near Term Space Based Radar Ad Hoc Task Force.
15 September 1980	Ground testing of the miniature vehicle (MV) started. The MV, built by the Vought Corporation, was the warhead to be used in the ASAT system. Ground testing included tests on a system test bench, drop tests inside a vacuum chamber, and an abbreviated program of qualification tests.
19 September 1980	Space Division issued a request for proposal to TRW, Incorporated, for the design of DSP Satellite 14, the first of four identical DSP satellites to be built by TRW, that would incorporate an improved sensor and survivability improvements.
22 September 1980	A critical design review was held on the Instrumented Test Vehicle being developed by Avco. The vehicle was to be used as a target in the testing of ASAT weapons.
27 September 1980	The government sent the Harris Corporation a show-cause notice, indicating that the government was thinking about cancelling Harris's contract for the Satellite Data Handling System (SDHS). After receiving the company's reply and weighing the alternatives, the government decided not to terminate the contract.
29 September 1980	Space Division and IBM signed a contract valued at $152 million for development and deployment of the GPS operational control system. The contract was

the result of an innovative four-step approach to the selection procedure, in which offerers submitted their technical proposals before submitting cost proposals.

30 September 1980 — SD contracted with RCA to acquire a second set of test equipment for the DMSP spacecraft. The second set would enable RCA to accelerate the delivery of satellites and would allow the Air Force to speed up replenishment of the depleted DMSP orbital constellation.

FY 1981

October 1980 — General Electric started developing a 10 Watt Solid State Amplifier (SSA) as a possible replacement for the 10 Watt Traveling Wave Tube Amplifier (TWTA) used in the DSCS III satellite. A successful preliminary design review on the SSA was held on 14 April 1981.

1 October 1980 — A task force directed by Major General Kulpa, Space Division's Deputy Commander for Space Operations, presented a revised final report on required initial capabilities and funding for a Consolidated Space Operations Center (CSOC) to AFSC. The briefing was presented to the Space Operations Steering Committee on 2 October 1980 and to the Secretary of the Air Force on 4 November 1980.

2 October 1980 — Space Division submitted a request for augmented pay rates for clerical personnel to the San Francisco Regional Office of the Office of Personnel Management (OPM). It asked that OPM grant permission for government offices in the area of Los Angeles International Airport to pay, from their own resources, significantly higher salaries than the grade levels would ordinarily allow to employees whose primary duties required skill in typing. The request was an attempt to deal with Space Division's problems in recruitment and retention of clerical personnel.

7 October 1980 — Space Division issued 90-day stop work orders affecting contracts in three programs: the Satellite Infrared Experiment (SIRE), the Modular Responsive Defense System (MRDS), and the Laser Countermeasures Demonstration.

10 October 1980 — Tetra Tech, Incorporated, submitted a proposed draft supplement to the Final Environmental Impact Statement of January 1978 for the Vandenberg STS Launch and Landing Site. The supplement would address program changes since 1978. The proposed

	draft supplement concluded that few aspects of the environment would be adversely affected to any significant degree by STS construction and operations at Vandenberg.
14-17 October 1980	A critical design review was held on the Ground Communications Network III (GCN III). GCN III was an upgraded communications network being procured for the Defense Support Program (DSP), and the contractor was Technology Development of California (TDC), a minority small business.
28 October 1980	Space Division awarded a contract to Santa Fe Engineering for construction of the second phase of the Orbiter Maintenance and Checkout Facility (OMCF) at Vandenberg AFB. The OMCF was part of the Vandenberg STS construction program. Award of the contract had been delayed by the need to submit a reprogramming request to Congress for more funds to cover the contractor's bid.
30 October 1980	Satellite F-4 of the Fleet Satellite Communications (FLTSATCOM) System was successfully launched from CCape Canaveral, Florida. With the addition of this satellite to the orbital constellation, the FLTSATCOM space segment was complete for the first time.
November 1980	A preliminary design review was held on the prototype user equipment that Magnavox was developing for the Global Positioning System (GPS) program.
November 1980	An independent Design Review Team finished evaluating the design of the Defense Meteorological Satellite Program (DMSP) Block 5D-2 satellite. The team identified 217 concerns, and the DMSP Program Office decided to address these concerns in three phases, with the most urgent concerns being dealt with first. Corrective action to address the highest priority concerns went on contract in June 1981.
November 1980	Satellite II-C7 was removed from the operational inventory of the Defense Satellite Communications System (DSCS). The satellite had lost both of its 20 Watt narrow coverage Traveling Wave Tube Amplifiers (TWTAs) and was no longer able to provide narrow coverage service.
November 1980	The Hughes Aircraft Company started work on the Generic TWTA Development Program. This was a long term program to upgrade the reliability of TWTAs used in military communication satellites.

November 1980	NASA moved Space Shuttle orbiter 102 out of the Orbiter Processing Facility at Kennedy Space Center to be mated to the external fuel tank and solid rocket boosters. Congress had made this action a prerequisite for Space Division to begin F Y 1981 construction activity on the Vandenberg STS construction program. Space Division therefore was able to authorize the Corps of Engineers to begin advertising for bids.
December 1980	The first Satellite Configuration Control Element (SCCE) was delivered to Sunnyvale AFS, California. By the end of April, it had been installed and had completed on site acceptance testing, as well as an interface test with a DSCS earth terminal. The SCCE was to control the configuration of the communications subsystem aboard the DSCS III satellites and to command the satellites in their house keeping and orbital control operations.
December 1980	Security Implementation Task Force began to define the problems created by the application of HQ USAF's STS Security Classification Guide to Johnson Space Center. The modifications at JSC that were necessary to comply fully with the guide would be more exten- sive than planners had earlier believed. The task force was headed by Maj General Hendricks, Vice Commander of Space Division. Studies of the guide's impact on Kennedy Space Center would begin March 1981.
December 1980	The Center for Marine Studies at California State University at San Diego and Hubbs/Sea World Research Institute delivered a study to Space Division on the environmental impact of shuttle-induced sonic booms on the California Channel Islands. The study concluded that the Space Shuttle's sonic booms were unlikely to disturb the wildlife populations on the Channel Islands to any significant degree.
December 1980	A program management directive (PMD) from HQ USAF provided official direction on development of the Consolidated Space Operations Center (CSOC). Priority would be given to taking over the functions of the AF Satellite Control Facility as soon as possible. Initial operational capability (IOC) was scheduled for mid-1986.
6 December 1980	An Atlas booster was launched successfully from Vandenberg AFB, California.
8 December 1980	General Electric was put on contract to acquire long lead parts for DSCS satellites III-B4 through III-B7, the first DSCS III production model

satellites. This was done through a letter contract, which was later definitized with an effective date of 29 May 1981.

8 December 1980 — An Atlas E booster failed to achieve orbit, destroyed itself during reentry into the atmosphere, and fell into deep waters of the Pacific Ocean about a thousand miles west of Vandenberg AFB, from where it had been launched. The cause was subsequently determined to be a premature shutdown of the booster engine because of an abrupt failure of the turbo pump.

12 December 1980 — Formal flight testing of laser communications hardware was completed at the White Sands Missile Range in New Mexico. The test used a laser transmitter installed in a C-135 aircraft and a receiver installed in a transportable ground terminal. It successfully demonstrated the ability of the transmitter to lock onto the receiver and send data to it at the extraordinarily high rate of one gigabit per second.

13 December 1980 — A Titan IIIB booster was successfully launched from Vandenberg AFB, California.

17 December 1980 — The last qualification motor in the Star 48 solid rocket motor development program failed a static firing test at the Arnold Engineering Development Center. The Star 48 was being developed by Elkton Division of Thiokol Corporation for the SGS II upper stage vehicle under contract to McDonnell Douglas Astronautics Company and for the PAM-D upperstage under development by NASA. The SGS-II would be used by the Atlas booster to launch NAVSTAR satellites.

19 December 1980 — Harris Corporation received a $1.67 million contract to build a DMSP Mark IV terminal for use by the Marines. Harris had already built four such terminals for use by the Air Force.

22 December 1980 — Testing of the IUS qualification test vehicle (QTV) began. During the rest of FY 1981, the QTV successfully passed hardware qualification testing, while some minor design errors required changes to software.

22 December 1980 — A supplemental agreement was issued to modify Rockwell International's contract for GPS satellites 9 through 12. The supplemental agreement provided that satellite 12, previously earmarked as the last Block I replenishment satellite, would be the Block 2 qualification satellite instead. The agreement raised the target

	price of the contract to $187.5 million, an increase of over $87 million.
31 December 1980	Space Division signed a letter contract with Ford Aerospace and Communications Corporation for the purchase of the NATO IIID communications satellite. A definitive contract was signed on 7 July 1981 and was valued at $45.551 million. The contract carried options for the fabrication of an additional satellite, NATO IIIE. Both satellites were to be used by the North Atlantic Treaty Organization (NATO).
January 1981	A critical design review was held on the software for the Commanding Segment of the new DMSP Satellite Operations Center.
January 1981	Construction started on Phase III of the STS Launch Pad at Vandenberg AFB. Construction had been delayed by the necessity of submitting a reprogramming request to Congress for more funds to cover the lowest bid for the project, which had been submitted by Santa Fe Engineering.
February 1981	A successful preliminary design review was held for the GPS Operational Control System.
February 1981	Critical Design Reviews were held for the Mission Planning Software that would be used in the DMSP Satellite Operations Center.
February 1981	TRW's contract for the Laser Countermeasures Demonstration was descoped, removing all design, development, test, and evaluation tasks, and leaving only analysis and assessment tasks.
3 February 1981	The Air Force Geophysics Laboratory launched a rocket probe as part of the Background Measurements Probe (BMP) program. The flight was unsuccessful because the payload failed to separate from the booster and the probe broke up during reentry. The objective of the BMP program was to gather data on the infrared background against which a space-based surveillance system would view space objects.
5 February 1981	IUS 2, the first IUS flight vehicle, began acceptance testing at the Boeing plant. IUS-2 was a Titan 34D IUS configuration.
11 February 1981	NASA cancelled long lead procurement of parts for all three of its three-stage IUS vehicles and one of its two-stage IUS vehicles. Space Division had added long lead procurement of parts for this follow on IUS production to the IUS development contract. NASA's cancellation caused higher per

	unit costs for IUS vehicles procured by the Air Force.
28 February 1981	Mayfair Construction Company completed modifications to SLC-4E at Vandenberg AFB. The modifications were required to launch the Titan 34D.
28 February 1981	A Titan IIIB booster was launched successfully from Vandenberg AFB, California.
March 1981	The DSCS III qualification satellite completed system level testing.
March 1981	Final qualification testing was completed on the Real Time Telemetry Analysis hardware that would be used in the DMSP Satellite Operations Center.
March 1981	Air Force organizations participating in the Advanced Military Spaceflight Capability (AMSC) program met at AFSC to present the result of studies and to develop a common set of goals. The goal of the AMSC program was to develop the technology required to build a military space vehicle, not necessarily a derivative of the Shuttle, which would serve as the Space Transportation System of the future.
9-20 March 1981	A preliminary design review was held on the Satellite Data Handling System (SDHS). Space Division considered the preliminary design to be basically acceptable. This was the second preliminary design review held on the SDHS. The design presented at the first review had been rejected as inadequate.
11 March 1981	NASA cancelled development of the three-stage and twin-stage IUS configurations. NASA's cancellation caused an increase in IUS costs to the Air Force since Space Division also had contracted with Boeing for IUS development.
16 March 1981	A Titan IIIC booster was launched successfully from Cape Canaveral AFS, Florida.
17 March 1981	Secretary of the Air Force Verne Orr announced the selection of a site near Peterson AFB, Colorado, for the Consolidated Space Operations Center (CSOC). Construction was to begin in 1983. Peterson AFB reportedly was selected because it was near the Space Defense Operations Center of the North American Air Defense Command, whose mission included protection of the satellites which CSOC would control. CSOC would control both DOD Shuttle operations and DOD satellite operations.

April 1981 — Installation of a DMSP terminal aboard the USS Enterprise was completed. The Enterprise was the fifth aircraft carrier to receive a DMSP production model shipboard terminal.

April 1981 — Space Division representatives briefed officials in Washington on the future of the Satellite Infrared Experiment (SIRE). The briefing was required because the cost of the program was high, the need for SIRE data seemed to have diminished, and the existing program was not the ideal way to satisfy those needs that still existed. The briefing did not elicit a decision on the future of the program; HQ AFSC decided to postpone that decision for a year.

April 1981 — Bench testing of the Miniature Vehicle, the key element of the anti-satellite system being developed by Space Division, was successfully completed. The testing demonstrated the reliability of the vehicle and its ability to perform acquisition, tracking, and guidance functions.

April 1981 — The Atlas MA-3 engine overhaul program began. The program was designed to lessen the chance of Atlas launch failures such as the one that had occurred on 8 December 1980. Under the program, Rocketdyne would completely tear down, inspect rebuild, and test fire 20 Atlas vehicles that had been placed in storage after removal from SAC ICBM silos without being overhauled by the contractor.

April 1981 — Initial operational capability (IOC) of the Vandenberg AFB Shuttle launch and landing site was changed from June to August 1984 because of delays encountered in reprogramming funds through Congress. The reprogramming was to award a contract for construction of Package III of the launch pad. In June 1980, IOC had been delayed from December 1983 to June 1984 because of similar delays in reprogramming funds for Package II of the launch pad.

April 1981 — A Space-Based Radar Program Office was created within Space Division's Deputy for Space Defense Systems. Its task was to manage development of space-based radar for the detection and tracking of atmospheric vehicles.

10 April 1981 — An on site review was held at TDC to review the company's progress on the GCN III contract. The company admitted that it was having problems and that there might be an additional schedule slip of

nine more months and additional cost growth of $4.6 million.

12 April 1981 — NASA successfully launched the first orbital flight test (OFT-1) of the Space Shuttle. Orbiter 102, the "Columbia," was launched from Kennedy Space Center, and was piloted by astronauts John W. Young and Robert L. Crippen. The Shuttle performed with only minor problems, carried out its planned tests during 54 hours on orbit, and glided to a flawless landing at Edwards AFB on 14 April.

20 April 1981 — The DOD requested permission to reprogram $7 million from the survivability area and $17 million from the space surveillance area in order to apply the money to the anti-satellite program, which was suffering from a severe funding problem. Congress later approved this request.

23 April 1981 — IUS qualification motors were x-rayed, and no cracks were found in the solid propellant. X-rays on 12 May 1981 also revealed no cracks. These x-rays demonstrated a successful resolution of propellant cracking problem which had occurred in four IUS motors cast for firing in the testing program. The cracks had caused delays in motor casting and delivery. The problem was solved by improvements in manufacturing and changes in design of the propellant grain.

24 April 1981 — A Titan IIIB booster was launched successfully from Cape Canaveral AFS, Florida.

27 April 1981 — The Air Force approved an acquisition plan for production of four DSP satellites. The plan called for these satellites to be procured through a block buy rather than through several annual buys. Economies resulting from the block buy were expected to reduce the cost of four satellites by $133.7 million. Congress later voted to restrict the block buy approach to procurement of long lead items; the satellites themselves were to be procured through traditional annual buys.

May 1981 — A critical design review was held, covering a computer upgrade at DSP processing stations. The upgrade was necessary to make these processing stations compatible with new DSP satellites and to replace existing computers that had become obsolescent and difficult to maintain.

May 1981 — A Microelectronics Task Force handed in a summary report evaluating development of micro-processors for GPS user equipment. Two companies, Rockwell and Magnavox, were developing prototype user

	equipment for the GPS program, and both were having trouble developing the microprocessors that would be employed in this equipment. However, the Task Force expressed guarded optimism that at least one of the two contractors would come up with a microprocessor that would meet standards, and it recommended against setting up a parallel or backup microprocessor program.
May 1981	McDonnell Douglas began work on a Task C addition to its contract with NASA's Marshall Space Flight Center (MSFC) for definition of a Science and Applications Manned Space Platform (SAMSP). Funded by Space Division, Task C required McDonnell Douglas to perform studies of the accessibility and utility of the proposed space platform for military purposes, and to determine what the impact of military missions and equipment would be on the platform's design. Under an addition to Task C made on 14 August 1981, McDonnell Douglas would actually define a military space platform.
8 May 1981	HQ USAF approved a request by Space Division and SAC for an orderly phase down of the Space Support Program (the Thor launch vehicle program). The remaining eleven Thors were stored at Norton AFB. The last program using the Thor as a launch vehicle, the Defense Meteorological Satellite Program (DMSP), had made a transition to the Atlas launch vehicle by program management direction dated 29 April 1980.
11 May 1981	Space Division cancelled the source selection process for the Sortie Support System (SSS). The SSS was to have provided a way for payloads to remain aboard the Space Shuttle and to be operated by a payload specialist from the aft flight deck of the orbiter. Other, less sophisticated support systems for experimental payloads would be used. Proposals for building the SSS flight hardware had been submitted by TRW and Rockwell.
12 May 1981	AFSC directed Space Division to proceed with its plan to borrow a pallet system under development by NASA to substitute for the cancelled Sortie Support System (SSS) in supporting an experiment on a Space Shuttle flight. NASA's pallet was being developed for use with its Space Lab. Space Division's Space Test Program office worked out a Memorandum of Agreement with NASA setting out the terms of the loan.
13-14 May 1981	A briefing on a proposed block buy for the GPS program was presented to DOD officials. The plan called for 28 Block 2 flight model satellites to be

	ordered in one block buy rather than in a series of annual buys. This approach would save $260 million and allow the GPS system to provide three-dimensional worldwide service 18 months earlier than would have been otherwise possible. The DOD approved the block buy approach.
14 May 1981	A Scout booster was launched successfully from Vandenberg AFB, California.
21 May 1981	A Space Laser Program Office was formed at Space Division.
28 May 1981	Space Division completed purchase of the Satellite Data Handling System (SDHS) by exercising two options in the SDHS contract. The basic contract covered design and development of the system and procurement of six operator consoles; the two options covered procurement of the remaining 29 consoles.
June 1981	A critical design review was held on the prototype user equipment that Rockwell International was developing for the GPS program.
June 1981	The OAO Corporation delivered a Flight Vehicle Simulator for use by the Defense Meteorological Satellite Program (DMSP). The Simulator would be used in the DMSP Satellite Operations Center.
June 1981	The second of two critical design reviews was held on the Stored Telemetry Processing System. The System would form part of the DMSP Satellite Operations Center.
June 1981	Space Division published a Corporate Plan identifying issues and goals important to the future of its personnel, organization and management, systems planning, acquisition process and space operations. The Corporate Plan was the result of a high level conference among Space Division's commander, vice commander, program directors, and key staff members on 5 March 1981.
June 1981	Design work began on security modifications at Goddard Space Flight Center in Greenbelt, Maryland, to protect classified data concerning DOD shuttle payloads. The modifications had been approved by the Secretary of the Air Force in November 1980.
June-September 1981	An incremental critical design review was held on the Prototype Mission Operations Center (PMOC). The PMOC would support the prototype anti-satellite system being developed by Space Division.

1 June 1981	Construction began on security modifications at Kennedy Space Center to protect classified data concerning DOD shuttle payloads. The modifications involved work on the Launch Processing System.
2-4 June 1981	Space Division conducted a successful critical design review of the IUS solid rocket motors developed by Chemical Systems Division.
19 June 1981	The first DSCS III flight satellite, III-A1, was accepted from the contractor. As a result of a decision by the Joint Chiefs of Staff on 5 May, the satellite was placed in storage for launch at a later time.
23 June 1981	An Atlas F, launched from Vandenberg AFB, successfully inserted into the proper orbit a payload (NOAA-C) sponsored by the National Oceanic and Atmospheric Administration.
25 June 1981	Space Division and Boeing completed negotiations for restructuring the IUS full scale development contract in light of Boeing's cost and schedule overruns. The restructured contract set a target cost of $506 million and a ceiling cost of $700 million. Boeing accepted a minimum loss of $5 million. Initial launch capability for the Titan 34D/IUS would be July 1982, and for the STS/IUS, September 1982.
25 June 1981	HQ USAF was briefed on the relationship between the Air Force Satellite Control Facility (AFSCF) and the Global Positioning System (GPS) control segment. The briefing recommended that the AFSCF and the GPS program share development tasks when possible and that the two systems be made interoperable.
25 June 1981	Space Division formed a program office to manage development of the new MILSTAR communications satellite. MILSTAR would serve the two way communication needs of the tactical/mobile community and the nuclear capable forces.
30 June 1981	Stanford Research Institute (SRI) was placed under contract to study the feasibility of a Space Plane. The proposed vehicle would be a small, reusable vehicle piloted by a crew of one that could be launched into orbit using existing launch vehicles for short duration military missions requiring only a small payload capacity. The contract with SRI was to end in July 1982. It was funded by DARPA through Space Division.
July 1981	Drop testing of the ASAT program's Miniature

	Vehicle was successfully completed. Results demonstrated that the vehicle could not only acquire and track targets but could do so during and after deployment from its dispenser.
July 1981	SCS Consulting Engineers, Incorporated, delivered the final volumes of a study of probable hazardous wastes generated at the Vandenberg Shuttle launch and landing site by Space Shuttle operations. The study identified types and amounts of wastes, options for their disposal and management, and costs of waste management.
17 July 1981	Space Division awarded a contract for construction of the Shuttle Payload Integration Facility (SPIF) at Kennedy Space Center to the Algernon Blair Corporation.
21 July 1981	The IUS pathfinder test vehicle (PTV-C), a Titan 34D/IUS configuration, arrived at the Solid Motor Assembly Building (SMAB) at Cape Canaveral, Florida. The vehicle was reassembled in the SMAB and retested. It waited in the SMAB until scheduled Titan launches had been completed before being moved to the launch pad for integration with a Titan 34D booster and a payload. The PTV was used to test procedures, facilities, and support equipment before flight vehicles were processed.
30 July 1981	The last of twelve IUS motor firings in the development program was successfully conducted at the Arnold Engineering Development Center. All of the development test firings had successfully met the specifications.
31 July 1981	The Air Force Geophysics Laboratory launched a rocket probe for the BMP program. Unlike an earlier flight conducted on 3 February, this flight was entirely successful.
31 July 1981	The North Atlantic Treaty Organization (NATO) cancelled the NATO-IV satellite program on the grounds that it would be too expensive. NATO-IV satellites would have been procured by the United Kingdom's Royal Aircraft Establishment and would have succeeded the NATO III satellites procured by Space Division.
August 1981	Final qualification testing was completed on the Real Time Telemetry Analysis software that would be used in the DMSP Satellite Operations Center.
August 1981	The firm of Henningson, Durham, and Richardson delivered a draft of an updated Socioeconomic Baseline Study of the effects of Shuttle related

construction at Vandenberg AFB. The original study had been part of the 1978 environmental impact statment on the Vandenberg Shuttle launch and landing site. Changes in initial operational capability and the addition of plans for new facilities had created a need for a new study. The new study identified needs for additional housing and social services in the Vandenberg AFB area.

August 1981 — The ASAT miniature vehicle began an abbreviated program of qualification tests. This mini-qualification program included electromagnetic interference, vibration, and shock tests. The electromagnetic interference testing was completed without incident, but during the vibration testing, conducted in October, the miniature vehicle was damaged. Testing had to be suspended for several months while the failure was analyzed and the vehicle was redesigned.

4-6 August 1981 — A successful preliminary design review was held for the GPS Block 2 qualification satellite.

5-6 August 1981 — Space Division briefed HQ AFSC and HQ USAF on funding problems affecting the Defense Meteorological Satellite Program (DMSP). The briefing indicated that DMSP Block 5D-3 satellites, which would be adapted for launch on board the space shuttle, would cost more than expected, and that available funds were not sufficient to cover the cost. Space Division recommended that the Air Force postpone procurement of the 5D-3 satellites for several years and maintain service in the meantime by procuring four additional 5D-2 satellites. Both HQ AFSC and HQ USAF accepted this recommendation.

17 August 1981 — The Star 48 motor failed another qualification test firing at the Arnold Engineering Development Center. It had previously failed a static firing on 17 December 1980. The Star 48 was being developed for the SGS-II upper stage vehicle by Thiokol Corporation under contract to McDonnell Douglas Astronautics Company, and for the PAM-D upper stage being developed for NASA. The SGS-II would be used with the Atlas booster to launch NAVSTAR satellites. As a result of the test failure, NASA delayed launches scheduled to use the PAM-D, and Space Division delayed the launch of NAVSTAR 7.

27 August 1981 — Initial operational capability (IOC) of the Vandenberg AFB Shuttle launch and landing site was changed from August 1984 to October 1985 as a result of changes incorporated in NASA's East Coast

	launch and landing site, the addition of an environmental shelter for erection and mating of the orbiter at Vandenberg, and delays in development of application software by Martin Marietta. This change in IOC was contained in a program management directive (PMD) from HQ USAF.
September 1981	A decision was made to use a larger computer in the Real Time Telemetry Analysis segment of the DMSP Satellite Operations Center. The larger computer (a Data General M-8000) was needed to accommodate the Real Time Telemetry Analysis software package, which had turned out to be larger and more complex than expected.
September-December 1981	An engineering model of the Single Channel Injection Subsystem (SCTIS) went through a limited program of Development Test and Evaluation. The SCTIS would allow AFSATCOM message traffic to be sent to Single Channel Transponders on board DSCS III satellites The results of the testing indicated that the SCTIS was ready to enter production, and a production contract was awarded to Stanford Telecommunications in September 1982.
1 September 1981	A Shuttle Activation Task Force (SATAF), Space Division Detachment 1, was activated at Vandenberg AFB. The SATAF would manage the on-site design, development, and construction of the Vandenberg STS Launch and Landing Site. The SATAF commander reported to Space Division's Deputy for Space Launch and Control Systems.
8 September 1981	A Titan IIID booster was launched successfully from Cape Canaveral AFS, Florida.

FY 1982

October 1981	The Air Force established a Directorate of Space Operations under the Air Force Deputy Chief of Staff for Operations. This office would complement the Directorate of Space Systems and Command/ Control Communications under the Deputy Chief of Staff for Research Development and Acquisition.
October 1981	A GPS satellite (GPS 6) completed system-level testing and was put into storage. It was originally scheduled for launch in September 1982, but delays in the availability of the Atlas booster and the SGS-II upper stage caused the launch to be postponed to FY 1983.
October 1981	A critical design review was held on the Operational Control System that was being developed

	for the GPS program.
October 1981	The doors to the Family Support Center at Los Angeles AFS officially opened. Two specialists, one military and one civilian, were assigned to provide family counseling services. In November 1981, the Air Force authorized establishment of a second Family Support Center to be located at Fort MacArthur.
2 October 1981	The first IUS flight vehicle, IUS-2, completed its acceptance testing ahead of schedule. It arrived at Cape Canaveral on 1 March 1982, was mated to the Titan 34D launch vehicle on 1 September 1982, and was mated to its payloads, the DSCS-II and DSCS-III spacecraft, on 29 September 1982.
2 October 1981	Severe cost and schedule problems forced Space Division to cancel development of GCN-III including TDC's contract. GCN-III was an improved ground communications network for the Defense Support Program. Efforts to find a substitute for GCN-III had to be postponed due to lack of funding.
30 October 1981	Space Division awarded a contract for construction of 200 units of military family housing at Fort MacArthur. The contract, worth $11,210,275, went to McMillin Construction of National City, California. Groundbreaking occurred on 19 November 1981; by 15 March 1983, all 200 units were completed and occupied.
31 October 1981	A Titan IIIC booster was launched successfully from Cape Canaveral AFS, Florida.
4 November 1981	The functional qualification testing of the software (Rev C) for the first IUS flight was completed. The flight launched DSCS II and DSCS III satellites on a Titan 34D.
9 November 1981	A letter contract for the refurbishment of the DSCS III qualification model was issued to General Electric. The letter contract was then definitized and added to the previously awarded long-lead contract as a supplemental agreement. This agreement was distributed on 28 May 1982, raising the target cost of the contract to $42.8 million and the ceiling price to $51.5 million.
12 November 1981	STS-2 was successfully launched from Kennedy Space Center in an orbital flight test.
13 November 1981	McDonnell Douglas began the design and production of payload fairings for the Transtage upper stage under letter contract F04701-81-C-0068.

23-24 November 1981	A critical design review was held on the Adaptive Sidelobe Cancellation System (ASLC). The ASLC was designed to protect receivers at ground stations from jammers.
December 1981	A system-level preliminary design review was held on DSCS satellites III-B4 and III-B5. The review covered new features that were being introduced into these satellites--features that would improve their reliability and performance and make them compatible with the space shuttle.
December 1981	LtGen Richard C. Henry, Space Division Commander, made the Deputy for Space Defense responsible for overall management of the Talon Gold Program. The Deputy for Space Defense previously had been responsible only for acquisition of the payload; it would now oversee activities relating to the pallet, including acquisition, integration of the payload into the pallet, integration of the pallet into the shuttle, and support of flight operations.
December 1981	An incremental critical design review of the antisatellite system was completed, and no major problems were found. The review covered the aircraft, the carrier aircraft equipment, and the missile that would be used in the system.
1 December 1981	Design of the STS parachute refurbishment facility at Vandenberg AFB was completed, but its construction was deferred indefinitely early in 1982 when Space Division reached an agreement with NASA to have STS components refurbished at Kennedy Space Center instead of Vandenberg.
8 December 1981	A briefing on the DSCS III program was presented to the Office of the Secretary of Defense; it sought permission to begin production of DSCS III satellites. OSD granted this permission, authorizing the Air Force to buy two DSCS III satellites in FY 82 and plan to buy two more in FY 83.
16-23 December 1981	A Tiger Team reviewed the status of the new DMSP Satellite Operations Center being activated at Offutt AFB, Nebraska. Activation of the Center was being delayed, primarily because of software problems. The Tiger Team drew up a plan for dealing with these problems and a schedule for correcting them. The next DMSP satellite could not be launched until the new Satellite Operations Center was activated.
18 December 1981	An Atlas E carrying the GPS NAVSTAR 7 satellite destroyed itself and its payload during a launch

	from SLC-3E at Vandenberg AFB. A final report submitted by a Safety Investigating Board on 12 February 1982 concluded that the number one booster engine had failed when hot gases burned through the wall of its gas generator and liquid oxygen feedline.
18 December 1981	DSCS satellite II-C7 was crippled by the failure of the shunt element assembly in its on-board power subsystem. The next day, the satellite was maneuvered into supersynchronous orbit and declared non-operational.
18 December 1981	Lack of funding forced Space Division to disband the mini-Program Office for Space Based Radar. Modest amounts of funding became available later, and on 25 June, HQ USAF requested that the Program Office be reestablished.
22 December 1981	Space Division's management and American Federation of Government Employees (AFGE) Local 2429 signed a collective bargaining agreement covering appropriated fund employees in the bargaining unit. The negotiations had been underway since 1978.
January 1982	Space Division entered into a joint program with NASA's JSC to define the Shuttle Operations and Planning Center (SOPC) portion of the Consolidated Space Operations Center (CSOC) using a baseline study of JSC's existing Space Shuttle flight control system. The SOPC definition effort was to last 15 months and cost $7.3 million.
January-February 1982	The sensor of the ASAT miniature vehicle was tested, and excessive noise was found in the sensor's signal processing electronics. The sensor was redesigned to correct the problem.
4 January 1982	Lockheed Space and Missiles Company was awarded a contract for Phase II of the Talon Gold Program, which was funded by the Defense Advanced Research Projects Agency (DARPA). During Phase I, Lockheed, along with a competing contractor, Rockwell International, had done some initial design work on the Talon Gold experiment. During Phase II, Lockheed was to complete the design and build the experiment.
7 January 1982	The PTV-C, the IUS pathfinder test vehicle for the Titan 34D, completed its processing through the SMAB. It was mated to the Titan booster for tests on 22 July 1982.
8 January 1982	The contract for the runway extension at Vandenberg AFB for the Space Shuttle Landing Site was awarded

to Ball, Ball and Brosamer, a joint venture located in Danville, California.

15 January 1982 — Space Division awarded General Electric a letter contract for the first DSCS III production model satellites, III-B4 and III-B5. Negotiations to definitize the letter contract were completed in August, and agreement was reached on a target price of $122 million.

21 January 1982 — A Titan IIIB booster was launched successfully from Vandenberg AFB, California.

23 January 1982 — A rocket probe carrying an infrared sensor was launched from the White Sands Missile Range, New Mexico. The sensor measured infrared radiation from asteroids and stars. A second probe flight was successfully carried out on 14 September 1982. Both flights were part of the Background Measurements Probe (BMP) program.

26 January 1982 — The Assistant Secretary of the Air Force for Research, Development and Logistics was briefed on the DSCS program. The briefing evaluated the idea of using a mixture of DSCS III satellites and other satellites in the DSCS space segment. After hearing the briefing, the Assistant Secretary rejected the idea of a hybrid constellation and endorsed the deployment of an all DSCS III constellation.

26-28 January 1982 — Space Division briefed private industry on its technology requirements and the opportunities for technology investment that they provided at a conference on Advanced Space Electronics held at Los Angeles AFS during January 1982. Another such conference was held on 29 July 1982.

29 January 1982 — Space Division released the first edition of a study called Military Space Systems Technology Model (MSSTM). Its basic purpose was twofold: to help laboratories plan their technology programs to support the requirements of space development programs between the years 1985 and 2010, and to foster communication about technology requirements with other developmental and user agencies. The General Research Corporation of McLean, Virginia, was put under contract by Space Division to work with the Aerospace Corporation in putting the study together.

29 January 1982 — Space Division awarded TRW a $47.8 million contract for parts and materials for three FLTSATCOM satellites F-6, F-7, and F-8. The satellites would be used to replenish the FLTSATCOM constellation.

	The contract was a long lead time contract--the first of its type ever awarded at Space Division.
11 February 1982	Under Secretary of the Air Force E.C. Aldridge ordered the development of a Higher Energy Upper Stage for DOD payloads. The new upper stage was to be capable of boosting 10,000 pounds into geosynchronous orbit, and it was to achieve an initial operational capability in FY 1987. The Air Force abandoned this plan by the end of Fiscal 1982, and decided to cooperate with NASA in the modification of the existing Centaur upper stage to a configuration compatible with the Space Shuttle.
12 February 1982	Software known as the on board digital data load (ODDL) for the first IUS flight on a Titan 34D launch vehicle was accepted. This software would actually command the IUS in flight after being updated before launch.
17-24 February 1982	A critical design review was held on GPS user equipment being designed by Magnavox. Following the review, Magnavox started building user sets for Development Testing and Evaluation. Rockwell International, the other user equipment contractor, had gone through a critical design review in June 1981 and had begun to build user sets. Both companies encountered delays; delivery of the first user sets slipped from FY 1982 to FY 1983.
19 February 1982	A qualification firing of an IUS small motor (QS-3) occurred, and post-fire inspection revealed a crack in the exit cone. The anomaly threatened to delay the launch schedule, but by June the program office had decided that the crack was a single incident caused by handling after manufacture.
19 February 1982	Representatives from SAC, TAC, ADCOM, AFSC, and Space Division met at the Pentagon and agreed to prepare lists of potential military requirements involving a space station and to send the lists to the Air Staff. The Air Staff was to provide the information to NASA for NASA's conceptual studies of space platforms.
March 1982	Hughes Aircraft Company began developing a generic 25-watt extremely high frequency Traveling Wave Tube Amplifier (TWTA) compatible with the new MILSTAR satellite. A conceptual design review on the 25-watt TWTA was held on 1 July 1982. Hughes was already working on a generic 40-watt super-high-frequency TWTA compatible with the DSCS III satellite, and a preliminary design review on the 40-watt TWTA was held on 1 May 1982.

March 1982	HQ USAF funded a study by AFSC, SAC, and AFLC of the possibility of converting 56 Titan II missiles, the last liquid-fueled ICBMs still on alert in SAC silos, to space boosters. Space Division decided that the conversion was feasible, and that the final cost for launching each Titan II space booster would be around $18 million.
March 1982	The Space Infrared (SIRE) sensor was subjected to off-axis testing at the Arnold Engineering Development Center. The testing revealed some deficiencies, but the contractor concluded that minor design changes would bring the sensor's performance up to desired levels.
5 March 1982	DMSP satellite 6 (S-6) was shipped to the launch site, Vandenberg AFB, California. S-6 was the first of a new generation of DMSP satellites called the Block 5D-2. In addition to introducing a new satellite, DMSP was moving to a new launch vehicle (the Atlas), making changes at the launch site, and activating a new Satellite Operations Center. All these elements had to be ready before S-6 could be launched. The launch site was ready in February 1982, but the booster was not erected on the pad until July, and the Command and Control Center was still undergoing tests the fiscal year ended. As a result, the launch of S-6 slipped into FY 1983.
6 March 1982	The last Titan IIIC booster with a classified payload was launched successfully from Cape Canaveral AFS, Florida.
11 March 1982	A plan suggesting that the activation of STS facilities at Vandenberg AFB could be reduced and still adequately support a low launch rate was briefed to the Secretary of the Air Force, along with a mission model showing requirements for only five shuttle launches from Vandenberg AFB through 1988. The plan was known as Vandenberg Activation Optimization. The idea of scaling down the Vandenberg AFB STS program by relying on processing of components at Kennedy Space Center was endorsed by the Office of the Secretary of Defense, AFSC and NASA.
12 March 1982	Space Division awarded a contract to Science Applications, Incorporated, to integrate all the elements of the Space Defense Command and Control System (SPADCCS). The basic contract was for a year; it carried options allowing it to be extended to a total of five years. The value of the basic contract plus options was $24 million.
16 March 1982	A construction contract for a commissary on Los Angeles AFS was awarded to C.V. Holder Construction

	Company of Gardena, California, at a cost of $6,052,000. Construction began one week later.
17-18 March 1982	A critical design review was held on the NATO IIID satellite. The review covered new features that were being introduced into the satellite, including the use of 40-watt traveling wave tube amplifiers (TWTAs) in place of 20-watt TWTAs.
21 March 1982	Augmented pay rates went into effect for government typists and stenographers working in the vicinity of Los Angeles International Airport. This action by the Office of Personnel Management rewarded a two-year effort by Space Division to make the salaries of its clerical personnel competitive with the salaries offered by nearby private corporations.
22 March 1982	STS-3 was successfully launched from Kennedy Space Center in an orbital flight test.
22-26 March 1982	A system-level critical design review on the GPS Block II satellite was held. Fabrication of hardware for the Block II qualification test vehicle started in April.
April 1982	Aerojet ElectroSystems Company went on contract to procure long lead parts and materials for four sensors to be flown on DSP satellites. In December 1982, a supplemental agreement was added to the contract covering the fabrication of two of these sensors, and an option was added covering the fabrication of two more.
1 April 1982	Space Division gave Boeing authority to proceed with initial production work on five IUS vehicles in the IUS follow-on production effort. This effort was added to a 1980 letter contract covering long-lead procurement for the follow-on production. The final contract for the follow-on production was to FY 1983 because of protracted negotiations.
1 April 1982	Space Division accepted a prototype microwave imager from the Hughes Aircraft Company. The microwave imager was a new type of sensor that would be flown on DMSP satellites. 13 April 1982 The Harris Corp. delivered a Mark IV DMSP terminal for use by the Marines.
17 April 1982	A Family Support Conference was held. Members of the Los Angeles AFS community were invited and more than 225 attended. Workshops and discussions were held with such favorable participant reaction that General Henry directed another conference be held six months later. The conference was the first

	base-level conference of its kind in the Air Force.
21 April 1982	The contract for the Integrated Operations Support Complex (IOSC), part of the Shuttle facilities, was awarded to the Charles Cunningham Construction Corporation of Santa Clara, California. This contract and one for the SAMTO Management and Engineering Facility (SMEF) had originally been part of the FY 1981 MCP, but both had been deferred to 1982 when Congress refused to approve funds for them.
30 April 1982	The fourth Balloon Altitude Mosaic Measurements (BAMM) flight took place from Chico, California. The purpose of the flight was to gather low solar scatter angle data in the short- and medium-wave length infrared bands from terrain including snow-covered mountains, mountain lakes and clouds.
May 1982	The Space Division Vice Commander established a Space Division Education and Training Council to render advice about the organization's training and education programs.
May 1982	The Aerojet ElectroSystems Company delivered sensors to TRW for integration into Defense Support Program satellites. The sensors had been upgraded in a project called Sensor Evolutionary Development.
May 1982	TRW went on contract to procure long-lead parts and materials for four DSP satellites. In September 1983, a supplemental agreement was added to the contract covering fabrication of satellites At the same time, an option was added to the contract covering fabrication of two other satellites.
May-July 1982	A DMSP shipboard weather terminal was installed aboard the aircraft carrier USS America.
1 May 1982	The contract for the SAMTO Management and Engineering Facility (SMEF) was awarded to A.J. Diani Construction, Incorporated, of Santa Maria, California. Construction began on 13 May 1982 with completion scheduled for August 1983. This contract along with the one for the Integrated Operations Support Complex (IOSC) had originally been part of the FY 1981 MCP, but both had been deferred to FY 1982 when Congress refused to approve funds for them.
6-7 May 1982	A critical design review was held on a 10-watt solid state amplifier that General Electric was developing for use in DSCS III satellites. Space Division felt that the design was inefficient--that

	the amplifier would require too much electrical power to generate a radio signal of the desired strength. It had GE shelve the original design and start work on a new design that would offer higher efficiency.
7 May 1982	HQ USAF directed AFSC to terminate the SIRE program. The Air Force felt that the program was taking too long, costing too much, and might not be the best way of achieving the goals in view. The SIRE experiment would have placed a long wave infrared sensor into orbit, and used the sensor to detect and track space objects against a stellar background.
10 May-9 October 1982	The new DMSP Satellite Operations Center was successfully tested at Offutt AFB, Nebraska. Completion of this testing cleared the way for the first DMSP Block 5D-2 satellite to be launched early in FY 83.
11 May 1982	A Titan IIIB booster was successfully launched from Vandenberg AFB, California.
1 June 1982	The experiments launched by Space Division's Space Test Program on Flight S81-1 were turned on. This flight had been launched earlier in 1982 on an expendable booster from Vandenberg AFB. Flight S81-1 carried two experiments provided by the Office of Naval Research, one dealing with solar flares and another dealing with energetic particle precipitation from the earth's magnetosphere.
1 June 1982	The concept of deputy commander was extended to four deputy commanders: the already extant Deputy Commander for Space Operations, a Deputy Commander for Launch and Control Systems Acquisition (formerly Deputy for Space Launch and Control Systems), a Deputy Commander for Launch Operations (an addition to the title of the Commander, SAMTO), and a new Deputy Commander for Space Systems Acquisition to whom the deputies of all the satellite program offices would now report.
4 June 1982	Space Division awarded a contract to TRW's Electronics and Defense Sector for integration of the Consolidated Space Operations Center (CSOC). The firm-fixed-price, level-of-effort contract was expected to run for about five years and was valued at roughly $69.3 million.
18 June 1982	Space Division accepted from Martin Marietta the first Transtage upper stage produced as a backup to the IUS for Titan 34D launches in 1983 and 1984.

21 June 1982	The Air Force Chief of Staff and the Office of the Secretary of the Air Force announced that a Space Technology Center would be established at Kirtland AFB, New Mexico, during FY 83.
22-24 June 1982	NATO held a working-level meeting to formulate options for the next generation of NATO communication satellites. Six options were selected, one of which was an enhanced NATO III. The options were to be evaluated in October 1982.
27 June 1982	Space Shuttle Orbiter 102 ("Columbia") was launched successfully from Kennedy Space Center on the Space Shuttle's fourth orbital flight test (OFT-4). It carried classified DOD experiments arranged by Space Division's Space Test Program. It landed on 4 July 1982 at Edwards AFB.
July 1982	A system-level critical design review was held on the Mobile Ground Terminal, which IBM was developing for the Space Division.
1 July 1982	Design work started on a nutation control system for the SGS-II upper stage. The system was intended to prevent the Star 48 motors used in the SGS-II from "coning" in flight. A successful preliminary design review on the system was held on 9 September 1982.
11 July 1982	Responsibility for servicing civilian personnel in AFCMD's Air Force Plant Representatives Offices (AFPROs) in Los Angeles County, Orange County, and Sunnyvale, California, was transferred from MAC's Civilian Personnel Office at Kirtland AFB to Space Division's Civilian Personnel Office. This action almost doubled the number of civilian personnel serviced by the office.
19 July 1982	In a contract managed by NASA, the development of the Restricted Access Processor (RAP) was awarded to Computer Sciences Corporation and Systems Technology, Incorporated. The RAP would control the transmission of classified data from DOD Space Shuttle flights at Goddard Space Flight Center.
August 1982	The staffs of Space Division and the newly-created Space Command cooperated in the preparation of Space Division's Budget Estimate Submission (BES).
August 1982	Construction of an Integrated Maintenance Facility at Edwards AFB was completed. The Facility was to support flight testing of the anti-satellite system.

3-4 August 1982	A preliminary design review was held on the EHF package being developed for the FLTSATCOM satellite. The package was being designed by Lincoln Laboratory and would be integrated into the satellite by TRW, the FLTSATCOM contractor. A preliminary design- review on the integration effort was held on 26 August 1982.
September 1982	IBM finished developing software that would allow DSP's processing stations to process mission data from the upgraded sensors. March meanwhile, IBM had gone on contract to develop software to command and control satellites carrying the new sensors, and to process telemetry from them. At the same time it had gone on contract to integrate all this new software with the opera- tional software currently in use.
September 1982	Coding and integration of software for the ASAT miniature vehicle was completed. However, this milestone was achieved later than expected; the software and the sensor were pacing the schedule for the miniature vehicle and the anti-satellite system as a whole.
1 September 1982	Space Command officially came into existance. It was a new major command formed to centralize Air Force space operations and to forge a stronger link between space research and development, and space operations.
1 September 1982	DSCS satellites II-F16 and III-A1 were flown to Cape Canaveral for pre-launch processing. The satellites were stacked one on top of the other on 23 September and mated to the launch vehicle, a Titan 34D/IUS, on 29 September. Launch was scheduled for late October.
1 September 1982	Rockwell International went on contract to provide long lead items for 28 GPSS Block II satellites.
7 September 1982	The contract for the orbiter towroute was awarded to A.J. Diani Company. They were to grade and resurface 17 miles of road within Vandenberg AFB and clear away obstructions such as shrubs and trees might interfere with the passage of the orbiter.
9 September 1982	The new program director of the Teal Ruby P80-1 program briefed a proposed rebaselining to Space Division's Vice Commander and took the briefing to AFSC at the end of September.
20 September 1982	Hughes started work on the development of a Common Pressure Vessel (CPV) nickel-hydrogen battery under

a contract awarded by the Aero-Propulsion Laboratory for Space Division.

20 September 1982 — HQ USAF issued direction affecting the GPS Operational Control System. The direction stated 1) that the Operational Control System should be interoperable with the AFSCF, 2) that AFSC should plan to put the GPS Master Control Station at Peterson AFB, Colorado, and to make it a part of the Consolidated Space Operations Center, and 3) that GPSS ground antennas should be located at Diego Garcia, Ascension, and Kwajalein, and GPSS monitor stations at Diego Garcia, Ascension, Kwajalein, Hawaii, and Peterson AFB.

30 September 1982 — A new IBM 3033 computer went on line at the GPS Master Control Station at Vandenberg AFB, California. The 3033 replaced an aging and unreliable Xerox 550 computer that could only support 6 satellites. The 3033 was large enough to support the full 18-satellite constellation that would eventually go into orbit for GPS.

30 September 1982 — Westinghouse was awarded a contract for one additional OLS sensor by Space Division. The Operational Linescan System was the primary sensor flown on the DMSP satellite. Westinghouse was to also provide software documentation and perform design studies. The contract's period of performance would run from October 1982 to August 1985 and have a value in excess of $23 million.

FY 1983

1 October 1982 — The Air Force Space Technology Center (AFSTC) was activated at Kirtland AFB to provide a focus for all Air Force space technology efforts. The headquarters of the AFSTC was formed out of most of the resources of Space Division's Deputy for Technology. The AFSTC was to oversee three Air Force laboratories which were most heavily engaged in space technology work: the Air Force Weapons Laboratory, the Air Force Geophysics Laboratory, and the Air Force Rocket Propulsion Laboratory. The new organization reported to the Commander of Space Division.

1 October 1982 — Fort MacArthur was officially transferred from Army to Air Force ownership. Although the fort covered more area at the time of the transfer than at any other time in its history, the Army had occupied only that portion called the Middle Reservation. Fort MacArthur became an annex to Los Angeles AFS, and Space Division used it as a site for military

	housing and personnel support facilities.
5 October 1982	The Harris Corporation was awarded a $10 million contract to build six DMSP Mark IV ground terminals for the Marine Corps. 28
October- 5 November 1982	A final design review was held on the Global Positioning System (GPS) Block II satellite.
29 October 1982	Space Division attached a Supplemental Agreement (SA) to a DSCS III advanced buy contract originally awarded to General Electric in FY 1981. The SA covered fabrication of DSCS III satellites B4 and B5. On 15 December, another SA was added to the same contract, covering fabrication of DSCS III satellites B6 and B7. These actions raised the target price of the contract to $308.8 million as of March 1983.
30 October 1982	The first launch of a Titan 34D launch vehicle and the first launch of the Inertial Upper Stage (IUS) successfully inserted a pair of DSCS satellites into near-perfect equatorial orbits. The satellites were DSCS II-F16 and DSCS III-A1. DSCS III-A1 was the first DSCS III satellite ever put into orbit and also the first DSCS satellite to carry an AFSATCOM single channel transponder.
1 November 1982	The Space Test Program Office became an autonomous two-letter office within Space Division. The Office had been part of the Deputy for Technology until that Deputate was abolished and most of its functions transferred to the new Space Technology Center.
11 November 1982	The fifth Shuttle flight (STS-5) was launched successfully from Kennedy Space Center, Florida.
17 November 1982	The last Titan IIID in the inventory was successfully launched from Vandenberg AFB, California.
18 November 1982	DSCS II-F16 finished on-orbiting testing and was turned over to the Defense Communications Agency.
8 December 1982	The first increment of a critical design review for DSCS satellites III-B4/B7 was held. The second increment was held 8-9 September 1983. The design review covered several new features being incorporated into these satellites. It also covered modifications needed to make the satellites compatible with the Space Shuttle.
9 December 1982	Space Division presented a briefing on costs and capabilities of the Consolidated Space Operations

Center (CSOC) to the Under Secretary of the Air Force. A working group sponsored by the Air Staff had estimated in November that the CSOC would cost more to build than the amount allotted for it in the Air Force's Budget Estimate Submission. In the briefing to the Under Secretary, Space Division defined a level of operational capability which would keep the program within budget by excluding the planned fourth mission control center for the Satellite Operations Complex (SOC), the crew simulator for the Shuttle Operations and Planning Complex (SOPC), and equipment for controlling the flight of the Space Shuttle.

20 December 1982 — An Atlas E successfully launched a DMSP satellite from Vandenberg AFB. This Atlas E used the first set of engines to be overhauled under the MA-3 engine overhaul program. The overhaul program had been instituted because of a series of engine-related failures of Atlas E launches. The payload was the first of a new generation of weather satellites called the DMSP Block 5D-2.

21 December 1982-13 April 1983 — The antisatellite (ASAT) missile went through six vibro-acoustic flights. These were captive flights designed to determine whether the missile could tolerate the vibration and loading it would receive as it was carried underneath the F-15 aircraft on its way to the launch point.

31 December 1982 — NATO passed up its last opportunity to buy a fifth NATO III communications satellite, NATO IIIE. Several options for fabrication of IIIE had been attached to a contract awarded to Ford Aerospace and Communications Corporation in December 1980. All the options were allowed to expire without being exercised.

1983

10 January 1983 — NASA officially informed Space Division of its cancellation of IUS vehicles 9 and 13 from the first IUS production buy. The cancellation was ordered by the Office of Management and Budget (OMB) because the scheduled payloads for the two upper stages, TDRSS satellites E and F, would not be ready for launch in the immediate future. (NASA had earlier, in 1981 and 1982, cancelled production plans for five other IUS vehices.) Since the effect of the cancellation would be a unit cost increase in the IUS vehicles the Air Force was buying, Space Division planned to proceed with the construction of the two vehicles using Air Force funds.

11 January 1983 — On-orbit testing of DMSP satellite F-6 was

finished. A new Satellite Operations Center at Offutt AFB had been used to command and control the satellite during on-orbit testing. It was declared operational as soon as testing was completed. The satellite itself was declared operational on 14 January.

13 January 1983 — Field testing of prototype GPS user equipment started at the Yuma Proving Ground in Arizona. first piece of user equipment to enter field testing was a 1-channel set from Rockwell International.

26 January 1983 — The IUS successfully completed its qualification test firings at Arnold Engineering Development Center. The test firing of qualifcation test motor QL-2 was the last of 24 test firings (12 development test firings followed by 12 qualification test firings planned for the IUS program). In all of these test firings, the IUS motors had successfully met their performance specifications. The successful conclusion of these tests cleared the way for the first launch of an IUS on the Space Shuttle.

27 January 1983 — Space Division awarded the first follow-on IUS production contract to Boeing. Boeing agreed to build and deliver six IUS vehicles between November 1983 and April 1985, as well as extra parts and refurbishment kits for Space Shuttle airborne support equipment. Eight IUS vehicles had already been purchased under the development contract with Boeing.

February 1983 — Space Division's Commander abolished the position of Deputy Commander for Space Operations and transferred its functions to the Deputy Commander for Launch and Control Systems. This action was taken because Space Operations had become the responsibility of the newly created Space Command.

9 February 1983 — The first Atlas H booster was successfully launched from SLC-3E at Vandenberg AFB. The Atlas H was essentially a modified SLV-3D. Space Division altered SLC-3E at Vandenberg AFB, formerly configured for the Atlas E, to support Atlas H launches.

23 February 1983 — A supplemental agreement was added to Space Division's contract with the Harris Corporation for the Satellite Data Handling System (SDHS). The agreement formally settled a long-standing dispute between Harris and the government over the SDHS, which was being developed for the DMSP system. It incorporated detailed specifications for the SDHS,

	as well as a delivery schedule, and it settled some claims that the contractor had presented to the government. The remaining claims were settled on 12 August.
March 1983	NATO decided that NATO III satellites would not play a role in its next space-based communications system. Instead, that system would utilize either DSCS III or Skynet IV satellites.
1 March 1983	The Transportable Mobile Ground Station (TMGS) program was transferred from Space Division's Deputy for Space Defense Systems to Space Division's Deputy Commander for Launch and Control Systems.
18 March 1983	DSCS III-A1 successfully completed on-orbit Development Test and Evaluation/Initial Operational Test and Evaluation. It was placed in operation over the eastern Pacific on 1 May.
25 March 1983	President Reagan issued National Security Decision Directive 85 (NSDD-85). In it, he called for 1) definition of a long-term research and development program to eliminate the nuclear ballistic missile threat and 2) completion of a study to assess the role of ballistic missile defense in future national security strategy. The Air Force responded by initiating the Defense Against Ballistic Missiles (DABM) study, which was eclipsed quickly by a larger OSD study. The OSD study was carried out by a group of experts, the Defensive Technology Study Team (DTST), chaired by J.C. Fletcher of the University of Pittsburgh. The Team's recommendations, issued in October 1983, became known as the Strategic Defense Initiative (SDI).
28 March 1983	An Atlas E booster was launched successfully from Vandenberg AFB carrying a NOAA-E satellite payload.
4 April 1983	The sixth flight of the Space Shuttle was launched, carrying NASA's TDRSS-A satellite for placement into a geosynchronous orbit by the first IUS launched from the Space Shuttle. The IUS experienced an anomaly during its second-stage burn that left the TDRSS in an incorrect, elliptical orbit. Because the satellite carried more hydrazine fuel than it normally needed, NASA was able to use the satellite's own thrusters to increase its velocity, circularize its orbit, and raise its altitude to a geosynchronous orbit. The cause of the anomaly on the IUS was traced by a Joint Air Force/NASA Board to a collapse of the nozzle gimbal mechanism which jammed the nozzle in

	the wrong position. The IUS program office began a long and exhaustive study of the IUS nozzle to prevent the reoccurrence of such an anomaly in the future. The next IUS launch on the Space Shuttle was postponed for a year.
15 April 1983	Space Division awarded Aerojet a $21.7 million contract to build four microwave temperature sounders for DMSP satellites.
15 April 1983	The Emergency Remote Tracking Station (ERTS) completed proof-of-concept testing in a remote environment on the island of Diego Garcia in the Indian Ocean. Ford Aerospace Corporation carried out the effort, which was designed to test the utility of a transportable tracking station for emergency situations in remote areas. The hardware was assembled from available components.
15 April 1983	A Titan IIIB booster was launched successfully from Vandenberg AFB, California.
22 April 1983	The Air Staff directed Space Division to halt the production of Titan 34D vehicles 15 and 16, effectively cancelling plans for 17 and 18 as well.
1 May 1983	Space Command replaced SAC as operator of certain satellite systems as part of the general realignment of space operational duties.
5 May 1983	The Army Corps of Engineers awarded a contract for site preparation for the Consolidated Space Operations Center (CSOC) to the firm of Schmidt-Tiago. Construction of the CSOC had been delayed by a design freeze imposed by Congress. To begin the construction as soon as possible after the freeze was lifted, the program office divided the design and construction work into two phases. Phase I was the site preparation, and it began before the completion of the design for Phase II.
10 May 1983	The Air Staff approved the flight of the Combined Release and Radiation Effects Satellite (CRRES), designating it P86-1. CRRES would be a joint mission by NASA's Marshall Space Flight Center and Space Division's Space Test Program. In NASA's portion of the mission, the spacecraft would release chemicals which would be tracked to study the interaction of the solar wind and solar flares with the earth's magnetic ionosphere. The Air Force's portion of the mission would consist of five experiments dealing with the interaction of the solar wind and solar flares with the earth's magnetic ionosphere. These included investigating a high efficiency solar panel, the effects of space

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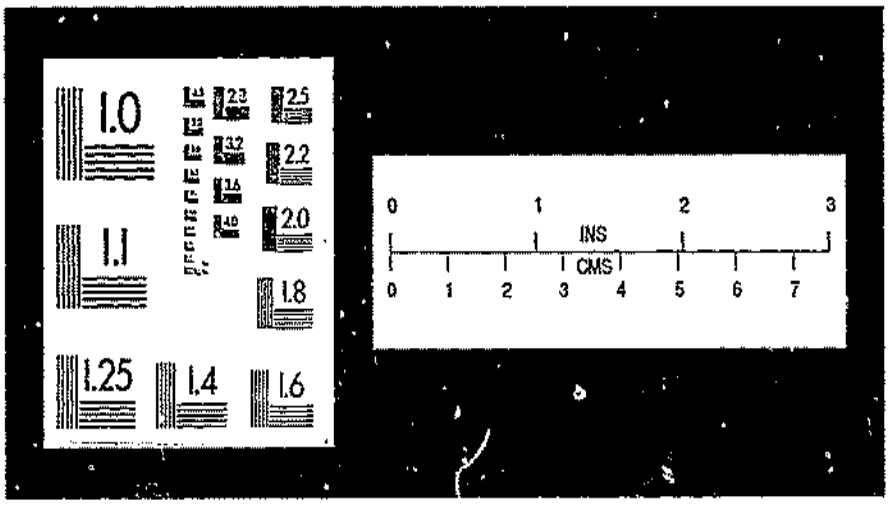

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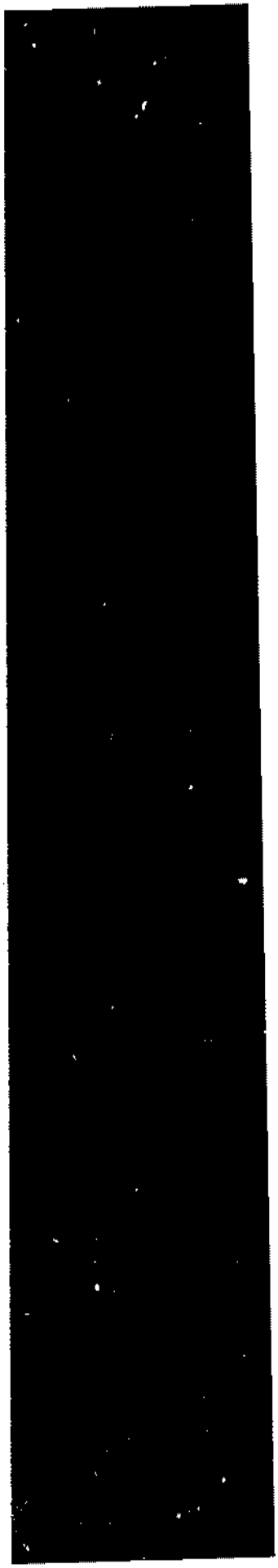

radiation on electronic devices, ionospheric irregularities, heavy ions, and solar flares. After the Air Staff's approval, NASA issued a contract change order to Ball Aerospace Systems Division, the contractor for the program, beginning the development phase of the CRRES mission on 1 June.

16 May 1983 — The missile to be used in the first free-flight test of the ASAT was delivered to Edwards AFB, California. Following delivery, it was built up in an inert condition and used in a Pathfinder demonstration. By the end of the fiscal year, it was being converted to flight configuration.

17 May 1983 — Space Division awarded contracts for Phase I of the communications for the Consolidated Space Operations Center (CSOC) to Ford Aerospace and Communications, Incorporated, and Space Communications Company. The contracts were valued at $4 million each and extended from 17 June 1983 to 16 June 1984.

17 May 1983 — The Commanders of Space Command and Space Division officiated at a ground-breaking ceremony for the Consolidated Space Operations Center (CSOC) in Colorado Springs, Colorado.

20 May 1983 — The Air Force signed a contract for 28 Global Positioning System Block II satellites. The satellittes were purchased from Rockwell International. The target price of the contract was $1.21 billion dollars, making it the highest dollar value satellite contract ever awarded. It was also the first multi-year procurement of production-model satellites by the DOD.

23 May 1983 — The Instrumented Test Vehicle, which would serve as a target when the ASAT was tested in space, completed qualification testing.

26 May 1983 — The ASAT missile underwent the first in a series of all-up captive flights. Seven such flights had been conducted by the end of FY 1983 and six more were conducted in FY 1984. Primary objectives were to assess the ability of the missile guidance system to navigate accurately, the ability of the F-15 carrier aircraft to take the missile to the launch point and perform the launch maneuver, and the ability of range instrumentation to support the ASAT flight test program.

June 1983 — A computer upgrade at DSP processing stations was completed.

7 June 1983	An Office of Corporate Planning was created at Space Division, following creation of a similar office at HQ AFSC. The corporate planning function had previously been performed by the Office of Plans.
9 June 1983	An Atlas H booster was launched successfully from Vandenberg AFB, California.
10 June 1983	Space Division placed TRW on contract to build three replenishment satellites for the FLTSATCOM system. The Air Force added a supplemental agreement to an advance buy contract awarded in FY 1982, covering fabrication of two satellites (F-6 and F-7), and an option covering fabrication of a third satellite (F-8). The target price of the entire effort was $217 million.
15 June 1983	New software went on line in the GPS Master Control Station. Together with the new computer installed the previous year, it would allow the Master Control Station to control the GPS space segment as it was expanded to a full constellation of 18 satellites. At this time the Master Control Station was still at its temporary location at Vandenberg AFB, California. It was later to be moved to a permanent site at Peterson AFB, Colorado.
18-24 June 1983	The seventh flight of the Space Shuttle was successfully carried out. Space Division's Space Test Program flew one payload, a "get-away special" (GAS), on the flight. The experiment was the Space Ultraviolet Radiation Environment (SURE), provided by the Naval Research Laboratory. The purpose of the experiment was to use an extreme ultraviolet spectrometer to obtain background radiation data from the earth and upper atmosphere. The GAS can housed the experiment, which was attached to the orbiter's payload bay, and was exposed to the space environment by means of an opening lid developed by NASA's Goddard Space Flight Center and funded by Space Division. This was the first use of the opening lid.
20 June 1983	A Titan 34D booster was launched successfully from Vandenberg AFB, California.
27 June 1983	Flight P83-1 (HILAT) of Space Division's Space Test Program was launched from Vandenberg AFB. The flight carried five experiments, four supplied by the Defense Nuclear Agency (DNA) and one supplied by the Air Force Geophysics Laboratory (AFGL). The experiments were integrated into a spare TRANSIT satellite, which the Navy provided at no cost. The

launch vehicle was a Scout booster obtained from NASA without cost, since NASA bought it for a mission which later was cancelled. The AFGL experiment was known as an Auroral Ionospheric Mapper, and it was to provide the first images of auroras on the sunlit side of the earth using ultraviolet sensors. This experiment failed during August 1983, but the Geophysics Lab obtained enough data to prove the feasibility of photographing the auroras in daylight by using ultraviolet sensors.

July 1983 — Senator Paul Tsongas introduced an amendment to the FY 84 Defense Appropriations Bill prohibiting testing of the ASAT against a space target unless certain conditions were met. Specifically, the President would have to cer- tify that the U.S. was trying to negotiate with the Soviet Union a treaty banning ASATs, and that pending completion of such negotiations, testing of an ASAT against a space target was vital to the interests of the U.S. The amend- ment was subsequently passed by Congress and became law.

7 July 1983 — A critical design review was held on the 10-watt high efficiency solid state amplifier being developed for the DSCS III satellite. On 28 July, the DSCS Program Office reviewed the status of the project and decided that it had enough confidence in the 10- watt solid-state amplifier to fly individual amplifiers on DSCS III-B4 and III-B5. If these amplifiers performed well enough, solid-state amplifiers would replace all 10-watt traveling wave tube amplifiers on III-B6 and subsequent satellites.

14 July 1983 — An Atlas E booster and an SGS-II upper stage successfully launched NAVSTAR 8 into orbit for the Global Positioning System (GPS). NAVSTAR 8 was the first GPS satellite to carry an IONDS payload for the detection of nuclear detonations. This launch was the first to use a nutation control system on the SGS-II's Star 48 solid rocket motors. The nutation control system used a thruster to compensate for a coning motion exhibited by the Star 48 motors.

15 July 1983 — Texas Instruments was awarded a contract to develop ground/airborne terminals for the IONDS program. The terminals would receive and process data on nuclear detonations relayed to the ground by sensors onboard GPS Block II satellites.

15 July 1983 — The Mission Control Program Office of Space Division's eputy Commander for Launch and Control Systems activated a Site Activation Task Force

	(SATAF) at Colorado Springs, Colorado, to oversee construction of the Consolidated Space Operations Center (CSOC) at the site.
21 July 1983	The commissary at Los Angeles AFS opened for business.
31 July 1983	A Titan IIIB booster was launched successfully from Vandenberg AFB, California.
August 1983	Space Division's Satellite Data System Program had been created in 1973; it was abolished after it had completed the procurement of all of the satellites in its directed program.
August 1983	The qualification unit of the Teal Ruby sensor began to undergo tests inside a specially-constructed radiometric test chamber at Rockwell International's Seal Beach facilities. These tests constituted the most important milestone in the program to date.
1 August 1983	Aerojet went on contract to upgrade computer peripherals at DSP processing stations.
1 August 1983	Martin Marietta submitted to the Air Force a building and launching with private funds four more Titan 34D vehicles beginning in 1986, using the residual hardware from Titan 34D-15 through 18. The proposal was not acceptable because the contractor did not wish to pay the costs of launch support or residual hardware, and it wished to relieve the government of only a small part of termination costs.
1 August 1983	NASA announced that its TDRSS E and F satellites, originally committed to IUS vehicles in the first production buy, would be launched on the Shuttle-configured Centaur.
3 August 1983	The Air Force announced to the public that the GPS Master Control Station, then located at Vandenberg AFB, California, would later be moved to Peterson AFB, Colorado, and installed in the Consolidated Space Operations Center to be built at that location.
14 August 1983	The Under Secretary of the Air Force granted final approval to process and store classified information about DOD Space Shuttle missions at NASA's Johnson Space Center using the Controlled Mode. The Controlled Mode was an interim procedure for protecting classified DOD information associated with Shuttle flights until the Air Force could begin operations at the Shuttle Operations

and Planning Complex (SOPC) of the Consolidated Space Operations Center (CSOC).

19 August 1983 — The miniature vehicle--the warhead to be used in the ASAT system--completed a mini-qualification test program.

25 August 1983 — Qualification testing of the ASAT missile, begun in May, was successfully completed at the Boeing facility at Kent, Washington.

30 August 1983 — STS-8 was launched successfully from Kennedy Space Center, Florida, carrying its payload, INSA-1B.

7 September 1983 — Space Division distributed a contract to RCA for of DMSP satellites 11-14. This was a multi-year procurement, and the contract had a target price of $171.6 million.

30 September 1983 — The laser communications (Lasercom) program was terminated because no funding was available in FY 1984.

FY 1984

15 October 1983 — The qualification sensr for the Teal Ruby Experiment completed its radiometric testing with encouraging results. The tests proved the general feasibility of the design, and demonstrated its predicted levels of responses and noise as well as its onboard processing.

18 October 1983 — General Electric was awarded an $11.9 million contract for a Hardcopy Image Processing System (HIPS). HIPS would be installed at the Air Force Global Weather Central. It would ingest data from military and civilian weather satellites, record the data on film, and produce photographs of cloud cover seen by the satellites.

25 October 1983 — The first earth-limb-clutter flight (ELC-I) in the Deputy for Space Defense Systems' Background Probe (BMP) program was successfully launched from White Sands Missile Range in New Mexico. Data from this and other flights in the BMP program would make it possible to design a surveillance satellite that could distinguish between radiation emitted by space objects and radiation emanating from the background.

November-December 1983 — A plan for restructuring the GPS user equipment test program was briefed to all the armed services and was approved. The original program had required user equipment to be tested on eight different host vehicles and a production decision

to be made at the beginning of FY 1985. The restructured program called for the user equipment contractors to focus their efforts initially on just five of the eight host vehicles. It also provided for two production decisions--on pilot production in January 1985, and on full production in May 1985. The restructuring was necessary because schedule slips had made it impossible to complete the original program in a reasonable length of time.

15 November 1983 — A system-level critical design review was held on the Satellite Data Handling System (SDHS). The SDHS was to be installed at the Air Force Global Weather Central and was to automate the job of analyzing weather data.

17 November 1983 — An Atlas E successfully launched DMSP satellite F-7 into orbit from Vandenberg. The Space Test Program's Flight S81-2 was successfully launched as a secondary payload on the same satellite. Flight S81-2 consisted of the Air Force Geophysics Laboratory's Ionospheric Current Systems and Auroras experiment (ICSA).

28 November 1983 — AFSC assigned integration management of programs dealing with Defense Against Ballistic Missiles to Space Division. Space Division had already contributed heavily both to the DABM study conducted by the Air Force and to the later SDI study conducted by OSD.

28 November 1983 — NAVSTAR 5 became non-operational due to an attitude control problem. Over the next several months, ground personnel worked hard to deal with the problem, but their efforts were unsuccessful and were abandoned on 11 May 1984.

28 November-
8 December 1983 — STS-9, OV-109, "Columbia", was launched successfully from Cape Canaveral AFS, Florida, carrying Spacelab-1.

28 November 1983 — Space Division's Space Test Program (STP) flew the first of a new class of payloads called Quick Response Shuttle Payloads (QRSPs) on Space Shuttle mission STS-9. These missions would consist of small, carry-on payloads which required little notice for manifesting. STP had begun to establish procedures for QRSPs early in FY 1983, drafting a proposed charter on the subject for issuance by USDR&E. It suggested that such payloads be required to have little or no interface with the orbiter, to be stowed in the orbiter's mid-deck lockers, to be operated by the crew members, and to be operated on the basis of non-interference with

the Shuttle's primary missions. The first QRSP, designated Q0001, was called the Aurora Photography Experiment (APE). It was sponsored by the Air Force Geophysics Laboratory, and it involved photographing auroras to learn their size, intensity, and other characteristics, and how they affected the Orbiter.

December 1983 — Space Division issued a change order to its contract with Ford Aerospace and Communications Corporation for the development of the Transportable Mobile Ground Station (TMGS). The change order restructured the program to a one-van configuration, eliminating the preliminary step of a validation model using two vans and a flatbed trailer. The IOC for the TMGS was extended from May 1985 to 30 April 1986.

December 1983 — Installation and testing of a DMSP shipboard weather terminal on board the USS Constellation was successfully completed.

2 December 1983 — An IUS small motor underwent the first of four test firings at the Arnold Engineering Development Center. The firings were part of a program to test hypotheses about reasons for a partial failure of IUS-1 in the launch of NASA's TDRSS-A satellite from the Space Shuttle on 4 April 1983, and to test hardware changes designed to prevent the failure from recurring. The first test firing was known as the Baseline Motor Firing. It was a thoroughly instrumented test of an existing IUS small motor and was designed to gather data about the thermal properties of the baseline motor, especially around the techroll seal and its titanium housing. When the nozzle was dissected after the firing, investigators found charred deposits indicating that some hot gases from the nozzle had passed in intermittent bursts over a small area of the grafoil seal. This finding reinforced the hypothesis that the techroll seal on IUS-1 had collapsed because of overheating, and it provided an explanation for how the overheating had occurred.

5 December 1983 — The miniature vehicle started a full qualification test program. Qualification testing would measure the ability of the vehicle to withstand the shock, vibration, extreme temperatures, and vacuum conditions it would encounter during launch and operation in space.

13 December 1983 — DSCS satellite II-B4 reached its tenth anniversary in orbit--quite an achievement for a satellite whose design life was only five years. Changes in the

inclination of the satellite's orbit were making it difficult for some users to maintain communication with it. The satellite was placed therefore in a spare status on 7 January 1984 and was later taken out of the operational inventory and dedicated to experimental purposes.

13-16 December 1983 — NASA and the Air Force held a Critical Design Review for the Centaur G', NASA's version of the Centaur upper stage being developed for the Space Shuttle, and the hardware common to both NASA's and the Air Force's versions of the Shuttle-configured Centaur. The Centaur G' and the Air Force's Centaur G were being developed by General Dynamics Corporation, which had developed earlier the Centaur version used on the Atlas and Titan.

19 December 1983 — Space Division received official direction from the Air Staff to build Titan 34D-15. The Air Staff had halted the production of Titan 34D-15 and Titan 34D-16 in April 1983.

23 December 1983 — Under Secretary of the Air Force E.C. Aldridge issued the memorandum "Assured Access to Space" calling on AFSC and Space Division to plan for a concept definition of a new procurement of expendable launch vehicles (ELVs). The candidates for the new ELV were an upgraded Atlas, an upgraded Titan 34D, and an expendable derived from components of the Space Shuttle. It was to be capable of placing 10,000 pounds into geosynchronous orbit in a payload envelope the size of the Space Shuttle's. Ten of these might be launched at a rate of two per year beginning in 1988 or 1989. Aldridge originally proposed using commercial procurement procedures as much as possible, so that the contractor would design, develop, produce, and launch the boosters with its own resources. The government would pay a negotiated fixed price at intervals. The concept therefore came to be known as the Commercial Expendable Launch Vehicle (CELV). When Congress and OMB declined to go along with this procurement method, however, the name of the concept was changed to Complementary ELV (CELV) to underscore its benign relationship to the Space Shuttle program.

6 January 1984 — The Air Staff issued direction for concept definition of the CELV. Space Division got the effort under way the same day by telephone calls to Martin Marietta (for the upgraded Titan 34D candidate) and General Dynamics Convair Division (for the upgraded Atlas candidate). Space Division issued the Statement of Work for concept definition

on 9 January 1984.

6 January 1984	National Security Decision Directive 199 (NSDD-119) was issued, calling for implementation of the Strategic Defense Initiatives proposed by OSD's Defensive Technology Study Team.
16-19 January 1984	Space Division's Expendable Launch Vehicles Program Office presented briefings to AFSC, the Air Staff, and Under Secretary of the Air Force E.C. Aldridge about the feasibility of converting inactivated Titan II ICBMs to space launch vehicles. The program office concluded that the Titan II would make a reliable launch vehicle. With minor modifications it could launch satellites for Space Division's Defense Meteorological Satellite Program and Space Test Program, as well as civilian meteorological satellites for the National Oceanic and Atmospheric Administration. The Air Staff's program management directive of 18 January 1984 directed AFSC to preserve the option of using the Titan II as a launch vehicle.
21 January 1984	The sensor used in the ASAT miniature vehicle started a test program at the Arnold Engineering Development Center. The testing at Arnold complemented testing done earlier at contractor facilities.
24 January 1984	Space Division distributed a contract to Westinghouse for four Operational Linescan Systems (OLS). The OLS was the primary sensor flown in the DMSP satellite, and it provided visual and infrared imagery of cloud cover on the earth's surface. The contract carried a firm fixed price of $51,487,944 and a period of performance running from December 1983 to August 1988.
30 January 1984	The first flight model microwave imager was delivered by the Hughes Aircraft Company. The microwave imager was a special sensor that would be flown on DMSP satellites beginning with satellites 9 and 10.
30 January 1984	A Titan 34D booster with a Transtage-1 upper stage was launched successfully from Cape Canaveral AFS, Florida.
3 February 1984	The Space Shuttle was launched on its eleventh mission (STS 41-B). During the mission, two PAM-D upper stages experienced separate malfunctions of their Star 48 motors. These failures left in unusable orbits their two commercial communications satellites, Western Union Telegraph Company's Westar 6 and Indonesia's Palapa B-2. The upper

	stage failures were significant for Space Division because its SGS-II upper stages, used to lift its NAVSTAR Block I satellites to higher orbits, were also powered by Star 48 motors. Space Division delayed the launch of NAVSTAR 9 while it conducted an investigation of the motor anomalies with the contractor for the upper stages, McDonnell Douglas. Although the investigation did not identify the exact cause of the failures with certainty, it concluded that the motors' exit cones had been defective because of undetected areas of insufficient density. The exit cones on the SGS-II upper stages did not exhibit these defects. NAVSTAR-9 was successfully launched on 13 June 1984, and NAVSTAR-10 was successfully launched on 8 September 1984 using SGS-II upper stages.
3-11 February 1984	The Space Test Program's Flight S84-5 was successfully operated during Space Shuttle mission STS-41B. Flight S84-5 was also known as CRUX (Cosmic Ray Upset Experiment). It was the second getaway special (GAS) payload sponsored by STP.
15 March 1984	DMSP satellite 8 was put in storage after completing integration and system-level testing. With this satellite in storage and available for launch when needed, DMSP had a call-up-capability for the first time in ten years.
20 March 1984	The Deputy for Satellite Command and Control Programs was created under Space Division's Deputy Commander for Launch and Control Systems. The new office was responsible for the Automated Remote Tracking Station (ARTS) Program and the Transportable Mobile Ground Station (TMGS) Program.
20-23 March 1984	The Air Force and NASA held a preliminary design review for the Centaur G. The Centaur G was the Air Force's version of the Centaur upper stage for the Space Shuttle being developed by General Dynamics Corporation under contract to NASA.
22 March 1984	The Air Staff authorized AFSC to continue its CELV efforts beyond concept definition and to release a request for proposals (RFP) for the procurement of the CELV as soon as the paper-work had been completed. Space Division issued the RFP on 30 March 1984. By 30 May 1984, it had received proposals from Martin Marietta for an upgraded Titan 34D; from General Dynamics for an upgraded Atlas; and from NASA for an expendable derived from the Space Shuttle's solid rocket motors, a Titan III liquid rocket engine stage, and a Centaur upper stage.

29 March 1984	Space Command and AFSC signed a supplement to an existing memorandum of agreement dealing with the CSOC. The supplement assigned five satellite programs to the Satellite Operations Complex (SOC) portion of the CSOC. Space Division had been planning to acquire the capability of controlling only four satellite programs from the SOC, and this change to the satellite control architecture contributed to making the SOC more expensive and to delaying efforts to place it on contract.
April 1984	Space Division awarded a contract to Rocketdyne for the test firing, overhaul, and delivery of eleven sets of Atlas engines from October 1984 through June 1987. The contract was valued at about $36 million. It covered the second increment of Atlas engines subject to the MA-3 engine overhaul program, which had begun in April 1981 as a response to a series of engine-related failures of Atlas launches. The first increment of nine engines had been overhauled under additions to an existing contract.
6-13 April 1984	The space shuttle "Challenger" (OV-099) was launched successfully from Cape Canaveral AFS, Florida, on a mission designated STS-13 (aka STS 41-C). It carried LDEF-1, Solar Max repair and Syncom-IV-2 satellite.
7 April 1984	NASA's Long Duration Exposure Facility (LDEF) was successfully deployed into a 285-nautical-mile circular orbit during the Space Shuttle's mission STS-41C. It was scheduled for retrieval by STS-51D in February 1985. Space Division's Space Test Program had integrated five payloads into the LDEF as STP Flight S80-1.
14 April 1984	A Titan 34D booster with a Transtage-2 upper stage was launched successfully from Cape Canaveral AFS, Florida.
16 April 1984	LtGen James A. Abrahamson assumed direction of OSD's Strategic Defense Initiatives Organization (SDIO). The SDIO provided centralized program direction and budgetary control to SDI technology programs carried out by agencies within the DOD, by NASA, and by the Department of Energy. These programs were reorganized under five new program elements corresponding to the Strategic Defense Initiatives proposed by the OSD's Defensive Technology Study Team in October 1983. The programs aimed at developing technology to defend the U.S. against the ballistic missile threat.
17 April 1984	A Titan IIIB was launched successfully from

Vandenberg AFB, California.

25 April 1984 — Space Division's Commander, LtGen McCartney, established the office of Assistant for Strategic Defense Initiatives to coordinate SDI efforts within Space Division's headquarters, its subordinate organizations, and other AFSC organizations, and to interact with other DOD agencies and the SDIO.

2 May 1984 — The Air Staff sent direction to SD to take the preliminary steps to contract for an option to complete the fabrication of Titan 34D-16. The Air Staff had halted the production of Titan 34D-15 and Titan 34D-16 in April 1983. It had issued direction to complete 34D-15 on 19 December 1983.

15 May 1984 — Space Division's Commander certified the Phase I TDRSS Network Ground System at NASA's Goddard Space Flight Center for the storage and processing of secret DOD information. Security modifications at Goddard were necessary to protect classified data in the Tracking and Data Relay Satellite System (TDRSS), whose first satellite had been launched in April 1983. Phase I involved the installation and modification of the minimum equipment necessary to support a classified DOD Shuttle mission.

15 May 1984 — Space Division's Commander granted approval to process classified information approval at NASA's Kennedy Space Center in support of DOD's Shuttle missions. The approval was conditional upon the correction of certain minor deficiencies. This certification constituted the attainment of IOC for KSC's security modifications, and additional security upgrades were to result in FOC before the first DOD Shuttle mission.

16 May 1984 — Space Division awarded contracts for system engineering and definition of the Shuttle Operations and Planning Complex (SOPC) portion of the Consolidated Space Operations Center (CSOC), under construction at Falcon AFS, Colorado. The contracts were awarded to the only two bidders, Ford Aerospace and Communications, Inc., and IBM. The contracts constituted Phase I of the SOPC acquisition. They were valued at $4.9 million each, and their period of performance was 16 May 1984 to 15 November 1985.

June 1984 — Space Division cancelled plans to produce 32-watt solid state amplifiers for use in DSCS satellites III-B8 through III-B14. Cost estimates indicated that the solid state amplifiers would be too expensive, so 40-watt traveling wave tube

amplifiers were to be used instead.

June 1984 — A second Network Security Ad Hoc Working Group (NSAHWG) submitted its final report. It had been formed by Space Division's Mission Control Program Office in September 1983 to restudy the security requirements at NASA's Goddard Space Flight Center and the cost of the necessary modifications in order to keep the work within the approved funding.

1 June 1984 — Space Division awarded a contract to Ford Aerospace and Communications Corp., for Phase I of the Automated Remote Tracking Station (ARTS) program. During Phase I, Ford would design and develop an ARTS configuration which could be used for all future tracking stations. It would also build and set up three of these stations: one at Falcon AFS, Colorado; a second at Thule tracking station in Greenland; and a third at a site yet to be selected. The contract was valued at $22,375,817, and its period of performance was 1 June 1984 to 30 September 1988.

5 June 1984 — AFSC assigned Space Division as lead division for the execution of all Air Force projects and tasks under the Strategic Defense Initiatives, except for those under the Battle Management/C^3 program element, for which ESD would be lead division. At the same time, AFSC assigned Space Division as integrating division to coordinate all Air Force SDI efforts. In response, Space Division drafted an Integrating Charter defining the roles of all AFSC organizations contributing to the SDI Program.

5-7 June 1984 — A preliminary design review (PDR) was held on the ground/airborne terminal being developed to receive and process data from NUDET sensors onboard GPS satellites. This was part one of a two-part PDR; part two was held 21-30 August. No serious problems surfaced in either session.

13 June 1984 — NAVSTAR 9 was successfully launched from Vandenberg AFB by an Atlas booster and an SGS-II upper stage. The satellite was declared operational on 12 July.

13 June 1984 — An Atlas E successfully launched Global Positioning System satellite NAVSTAR-9 into orbit.

15 June 1984 — The Air Staff issued program direction to proceed with the acquisition of three Transtage upper stages in addition to the four Transtages (and one spare engine) procured by Space Division earlier. Space Division responded by issuing letter contracts to Martin Marietta for the air frames, to Aerojet for liquid rocket engines, to Delco for

	inertial guidance systems, and to McDonnell Douglas for the Transtage fairings.
25 June 1984	Space Division awarded contracts to Boeing and Vought to procure long lead items needed in producing ASAT missiles. Contract award had been delayed for almost six months by Congressional actions--especially by a Congressional requirement that the White House submit a report on its arms control plans in the ASAT area before awarding any ASAT long lead contracts.
25 June 1984	DARPA officially transferred all responsibility for the TALON GOLD program to OSD's Strategic Defense Initiatives Organization (SDIO). The program had suffered a large estimated cost overrun in 1984. In August 1984, Space Division briefed LtGen Abrahamson, SDIO Director, on options for restructuring the program.
25 June 1984	A Titan 34D was launched successfully from Vandenberg, California.
27 June 1984	Space Division returned unopened the original responses to its RFP for the CELV procurement because of a mistake in the RFP. It released a revised RFP on 20 July 1984. The same three offerors (Martin Marietta, General Dynamics, and NASA) submitted proposals.
1 July 1984	Los Angeles AFS became a closed station when guards were posted at all open gates. Vehicles without DOD decals had to obtain visitors' passes, and pedestrians who were not in uniform had to show authorized identification or obtain a visitor's pass.
5 July 1984	Construction of the NAVSTAR Processing Facility began at Cape Canaveral AFS, Florida. In this facility, GPS Block II satellites would be mated to PAM-DII upper stages prior to launch on the space shuttle. The facility would be dedicated to the sole use of the GPS program and would help it achieve the very difficult goal of preparing 21 satellites for launch within a three-year period.
6 July 1984	TRW started mating a prototype EHF package into a qualification model FLTSATCOM spacecraft. A successful series of integration and electromagnetic compatibility tests was performed on the two, ending on 20 August 1984. EHF packages were to be flown on FLTSATCOM satellites F-7 and F-8 as precursors to the EHF payloads that would later be flown on the new MILSTAR satellites.

11 July 1984	The last electronic box for the GPS Block II qualification satellite was delivered. This represented a major schedule slip, since delivery was orginally scheduled to be completed over ten months earlier. Once the boxes were installed on the satellite, problems were discovered in several of them, and four boxes had to be removed from the satellite for trouble shooting. This caused an additional month of delay.
18 July 1984	A preliminary design review was held on the N-sensor, which would be added to the NUDET Detection System payload flown on GPS Block II satellites. The NUDET Detection System had previously been referred to as the Integrated Operational NUDET Detection System (IONDS).
27 July 1984	Under Secretary of the Air Force E.C. Aldridge briefed the Defense Resources Board (DRB) about converting inactivated Titan II ICBMs to space launch vehicles. The DRB, which made the final decisions about budgetary matters within DOD, directed that the Titan II modification program proceed. Space Division's Expendable Launch Vehicles Program Office therefore began to plan its business strategy for placing the effort on contract.
August 1984	President Reagan approved a National Space Strategy issued as National Security Decision Directive 144. Among other subjects, the directive dealt with the relationship of expendable launch vehicles to the Space Shuttle and endorsed the Air Force's use of a limited number of expendable launch vehicles. This endorsement approved the Air Force's proposal to develop the CELV.
August 1984	Installation and testing of a weather terminal on board the USS Nimitz was successfully completed. The Nimitz was the eighth aircraft carrier to receive a DMSP production model shipboard weather terminal.
15 August 1984	Site preparation for the CSOC facilities at Falcon AFS, Colorado, was completed by the firm of Schmidt-Tiago under the supervision of the Army Corps of Engineers.
22 August 1984	The completed NATO IIID satellite arrived at Cape Canaveral AFS and began pre-launch processing. Launch was scheduled for mid-October 1984.
23 August 1984	Space Division and McDonnell Douglas completed all negotiations for 28 PAM-DII upper stages. The upper stages would be used to launch GPS Block II satellites. The contract was a multi-year contract

with a total value of $169.4 million. It was the largest upper stage contract ever awarded.

23 August 1984 — A Program Decision Memorandum issued by the Deputy Secretary of Defense contained the final direction to proceed with the modification of inactivated Titan II ICBMs into space launch vehicles.

28 August 1984 — A Titan IIIB was launched successfully from Vandenberg AFB, California.

29 August 1984 — The third static test firing in the IUS anomaly recovery program, known as the Witness Firing, took place at Arnold Engineering Development Center. The Witness motor incorporated all of the changes in design and manufacturing that were intended to guard against another failure. It was identical to the small motor that would be used in the next IUS launch from the Space Shuttle. The results seemed to confirm the success of the modifications. The temperatures measured around the techroll housing were well below the nominal predictions, and the nozzle's nosecap did not move as it had in the two previous tests.

29 August-5 September 1984 — STS-14 (41-D) was launched successfully from Cape Canaveral AFS, Florida, carrying the Telstar 3C satellite, SBS-D and OAST-1.

29 August 1984 — Space Division's Space Test Program flew the second Quick Response Shuttle Paoad (QRSP) on Space Shuttle mission STS-41-D. This QRSP, designated Q0002, was known as Cloud Formation, Dissipation and Opaqueness (CLOUDS). It was sponsored by the Air Weather Service, and its purpose was to document cloud cover, dynamics, and morphology near weather stations where ground measurements could be made concurrently.

September 1984 — A report by a committee of the National Research Council supported the Air Force's decision to complement the Space Shuttle with ELVs. In response to a call to examine the CELV proposals, the NRC pointed out that the commercial proposals possessed an advantage over NASA's proposal in not relying on the Shuttle's launch facilities.

8 September 1984 — NAVSTAR 10 was successfully launched from Vandenberg AFB by an Atlas booster and an SGS-II upper stage. It was declared operational on 3 October.

10 September 1984 — A $12 million contract for six DMSP Mark IV weather terminals for the Air Force was distributed to the Harris Corporation. The contract also carried

options that would enable the Marine Corps to buy five terminals if funding became available.

13 September 1984 — Space Division awarded contracts to four companies (Grumman, Lockheed, TRW, and General Electric) to concept definition studies on a Boost Surveillance and Tracking System (BSTS). BSTS was one of the programs included in the Strategic Defense Initiatives (SDI), the aim of which was to develop technology for defending the U.S. against ballistic missiles.

13 September 1984 — Space Division awarded three contracts for concept definition, program planning, and development of technology for the Space Surveillance and Tracking System (SSTS), which Space Division was managing for the Strategic Defense Initiatives organization (SDIO). The contracts were awarded to Rockwell, Lockheed, and TRW.

14 September 1984 — The Fort MacArthur Museum opened in Building 37 on Fort MacArthur. The museum contained displays on the history of the Fort and of Space Division.

October 1984 — An expendable booster launched from Vandenberg AFB successfully placed the Space Test Program's Flight S85-1 in orbit. S85-1 consisted of two experiments: an Upper Atmospheric Composition Spectrometer (UACS) sponsored by AFSC, and a Polar Ozone and Aerosols Measurement (POAM) experiment sponsored by the Office of Naval Research. The UACS failed after three hours of operation.

1 October 1984 — Space Division awarded a multi-year contract to General Electric for production of DSCS III satellites B8 through B14. The contract carried a firm fixed price of $423 million plus an award fee of $10.5 million.

ILLUSTRATIONS

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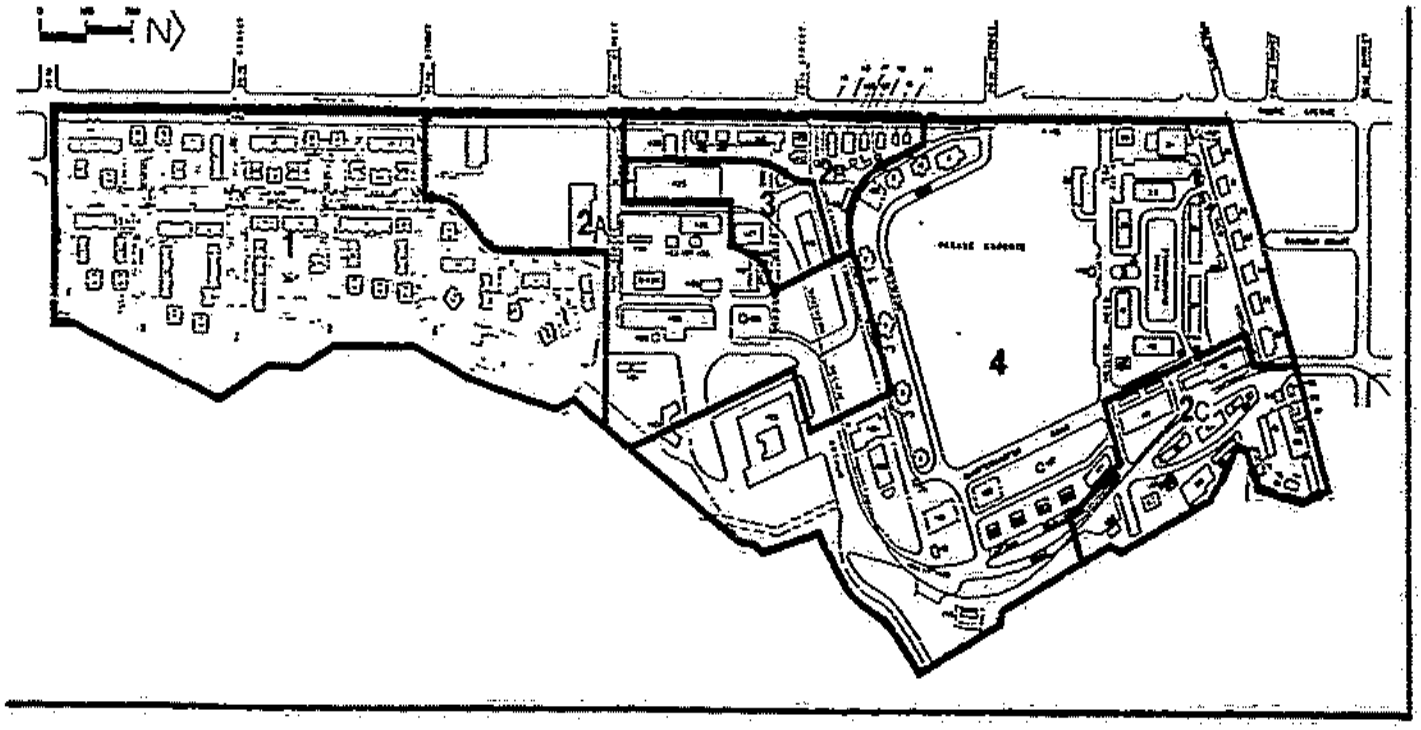
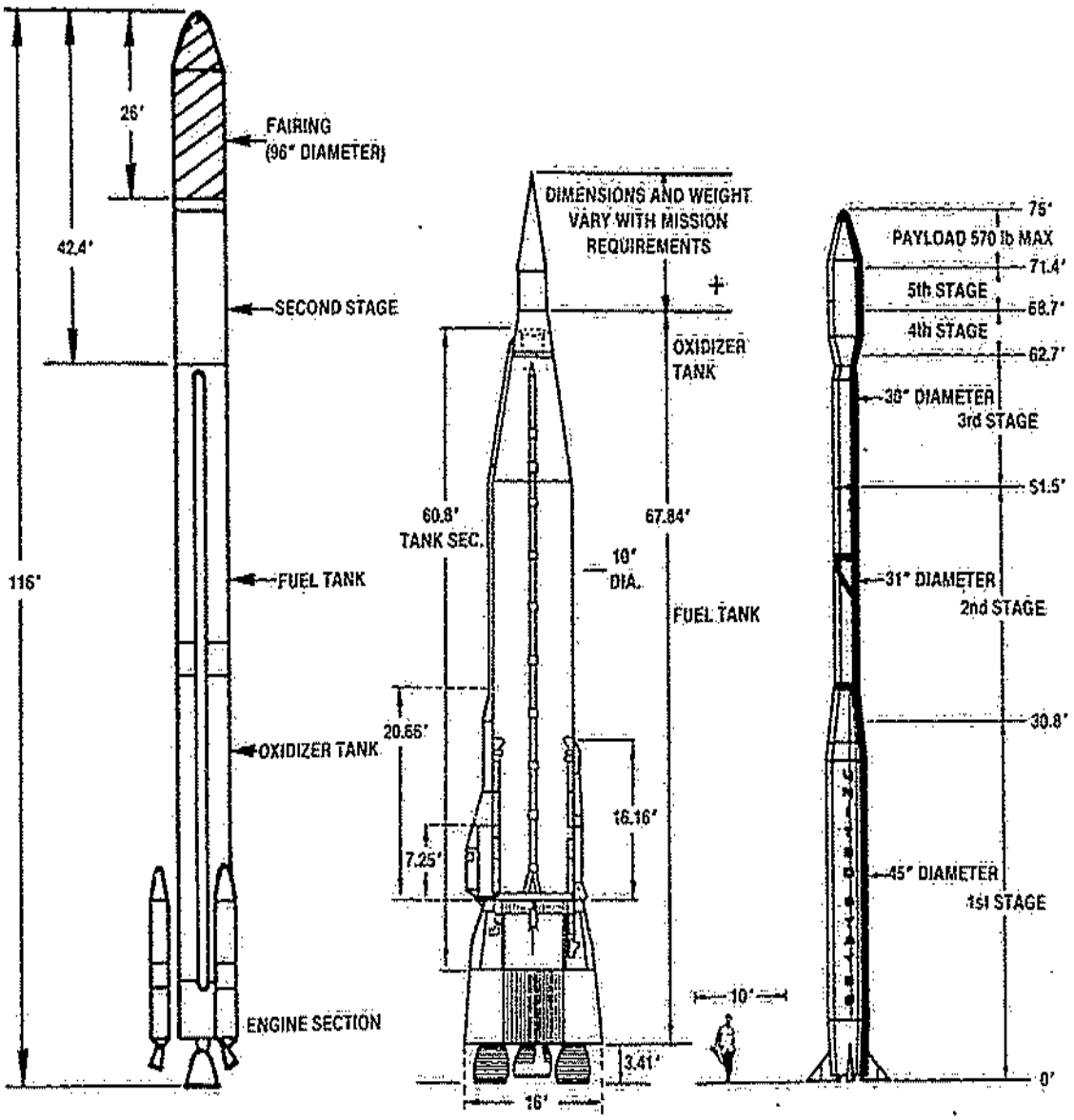
ILLUSTRATIONS

FORT MACARTHUR FAMILY HOUSING

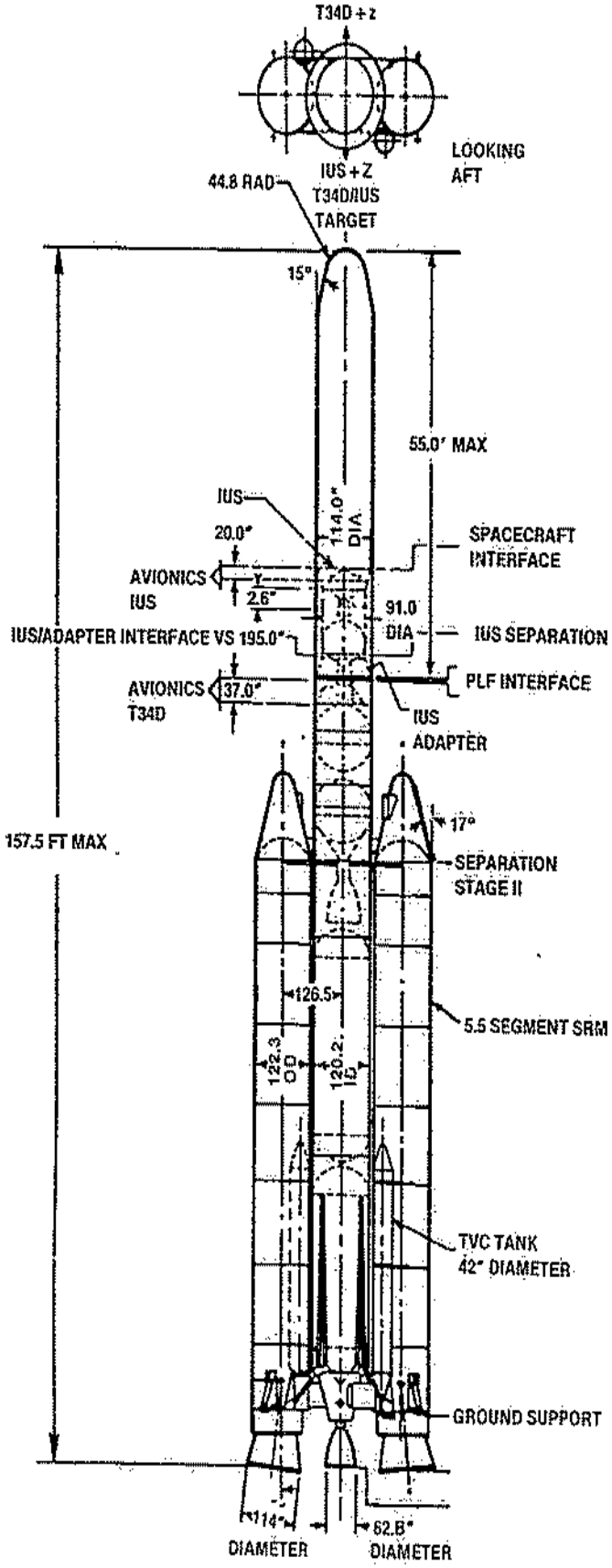


1 200 AF UNITS
2A POTENTIAL DEVELOPMENT SITE - 135 AF UNITS
2B POTENTIAL DEVELOPMENT SITE - 15 AF UNITS
2C POTENTIAL DEVELOPMENT SITE - 50 AF UNITS
3 TRONA PLANT COMPLEX (EXISTING BUILDINGS TO REMAIN)
4 PATTON QUAD/PARADE GROUND/POOL/CLUB/500 VARAS SQUARE (EXISTING BUILDINGS TO REMAIN)

SMALL AND MEDIUM LAUNCH VEHICLES

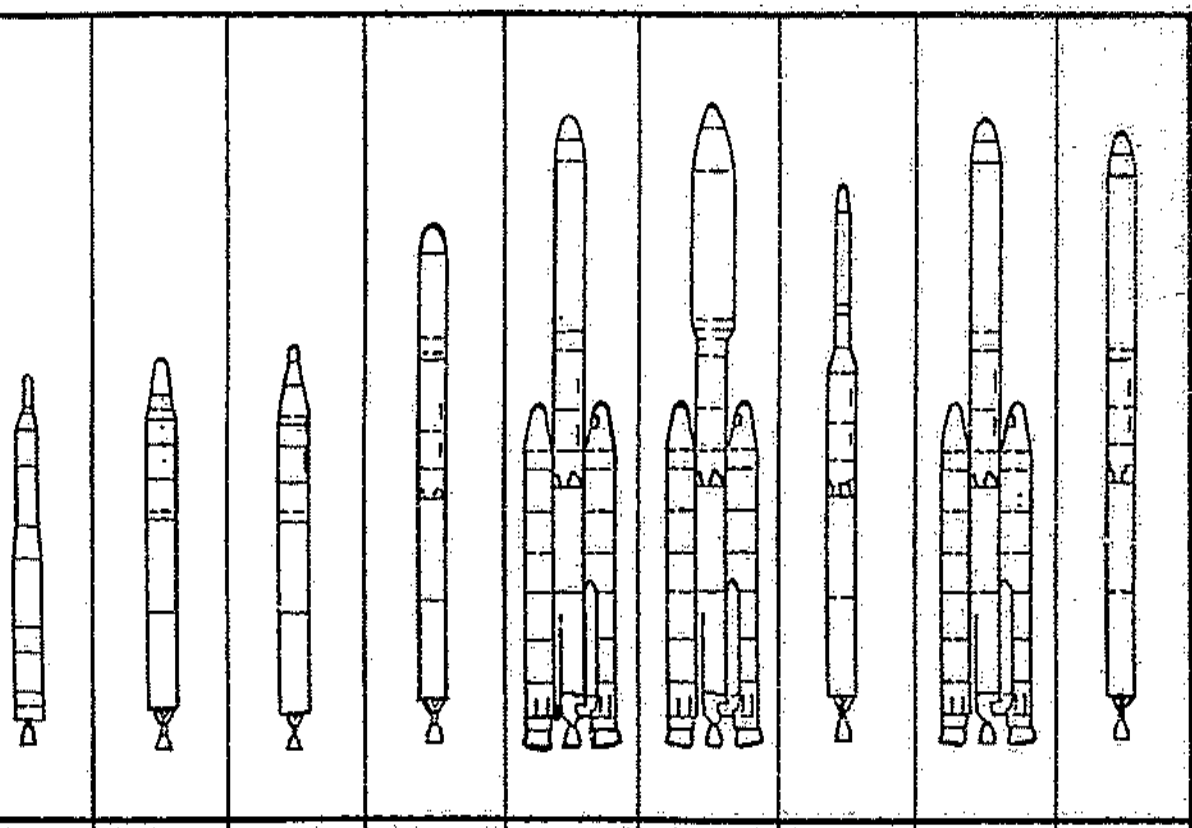


DELTA ATLAS SCOUT

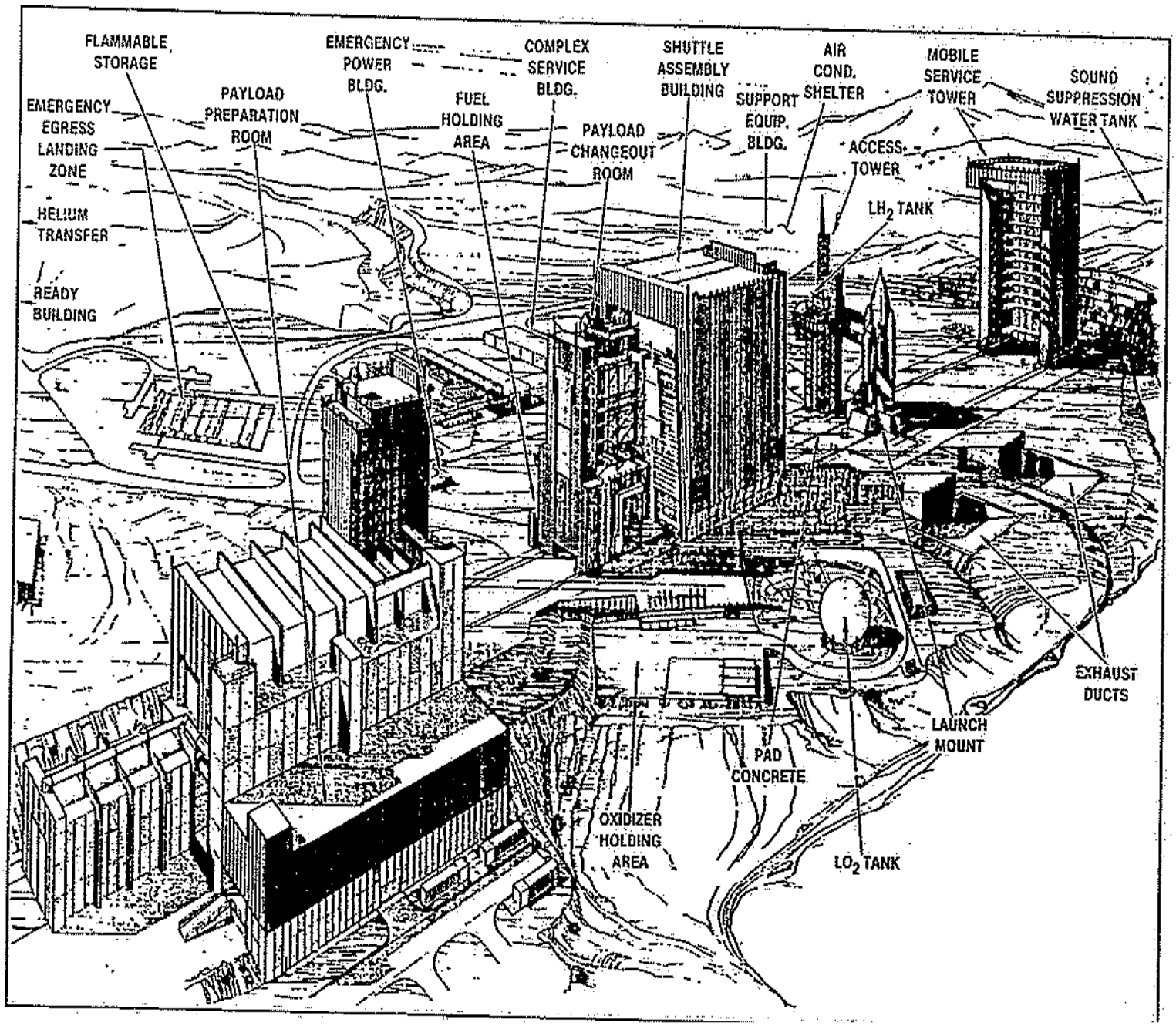


TITAN III (34)D WITH INERTIAL UPPER STAGE

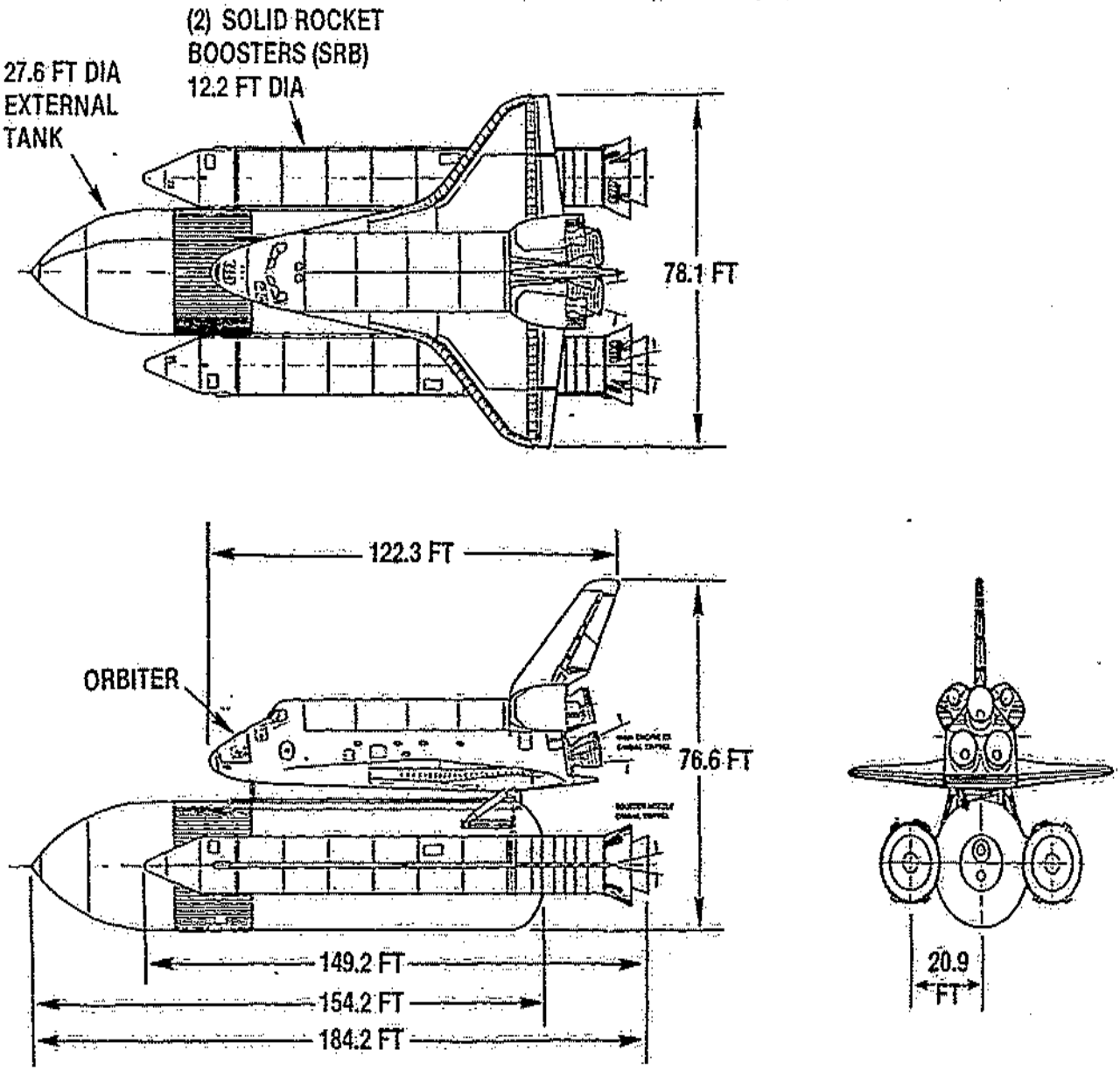
TITAN VEHICLE LEGACY



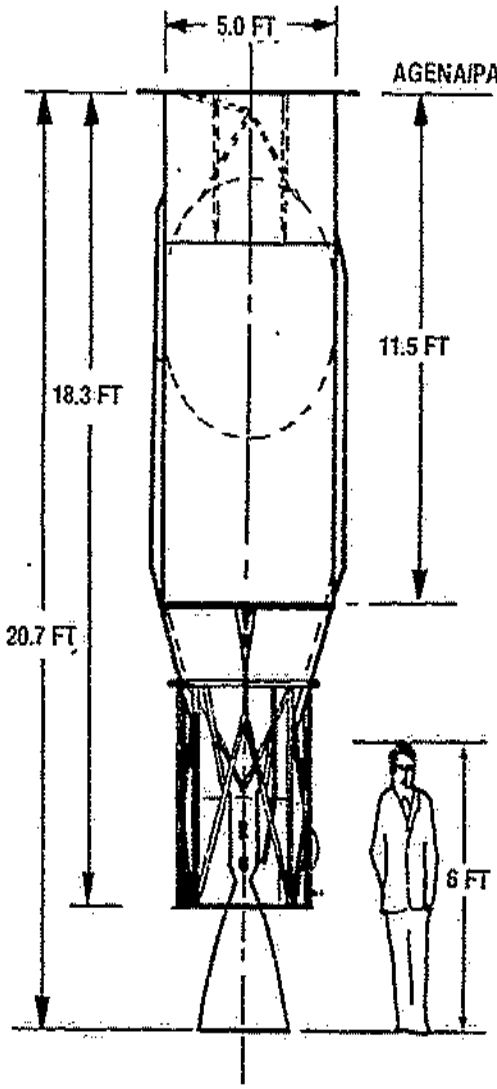
I	II	GEMINI	IIIA	IIIC	IIIE	IIIB	IIID	34B	34D
FLIGHTS: 67	81	12	4	36	7	56	22	10	5
TIME: 1959-65	62-76	64-66	64-65	65-82	74-77	1966-84	1971-82	1975 →	1982 →


FLAMMABLE STORAGE
EMERGENCY POWER BLDG.
COMPLEX SERVICE BLDG.
SHUTTLE ASSEMBLY BUILDING
AIR COND. SHELTER
MOBILE SERVICE TOWER
SOUND SUPPRESSION WATER TANK
EMERGENCY EGRESS LANDING ZONE
PAYLOAD PREPARATION ROOM
FUEL HOLDING AREA
PAYLOAD CHANGEOUT ROOM
SUPPORT EQUIP. BLDG.
ACCESS TOWER
HELIUM TRANSFER
LH_2 TANK
READY BUILDING
EXHAUST DUCTS
LAUNCH MOUNT
PAD CONCRETE
OXIDIZER HOLDING AREA
LO_2 TANK

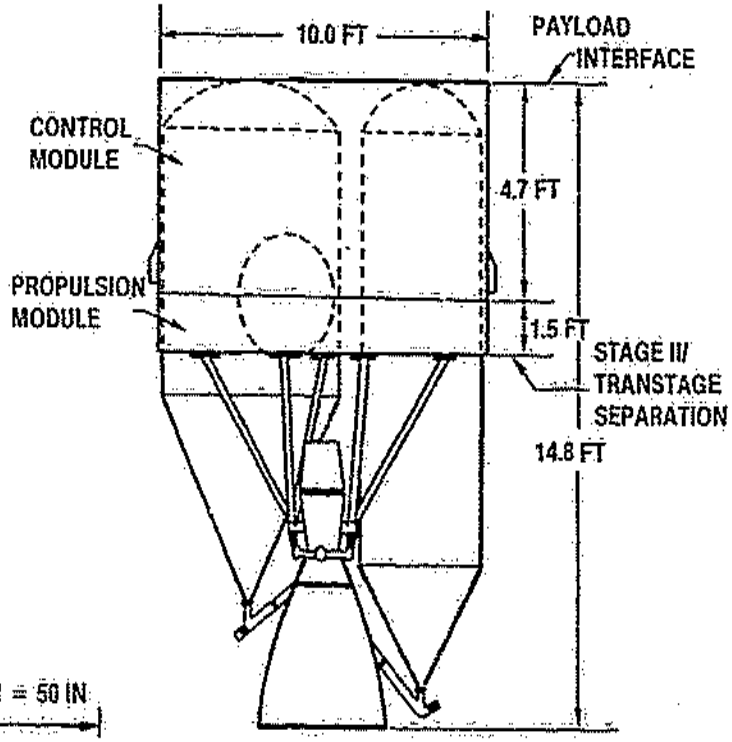
SPACE SHUTTLE
SPACE TRANSPORTATION SYSTEM
ORBITER VEHICLE



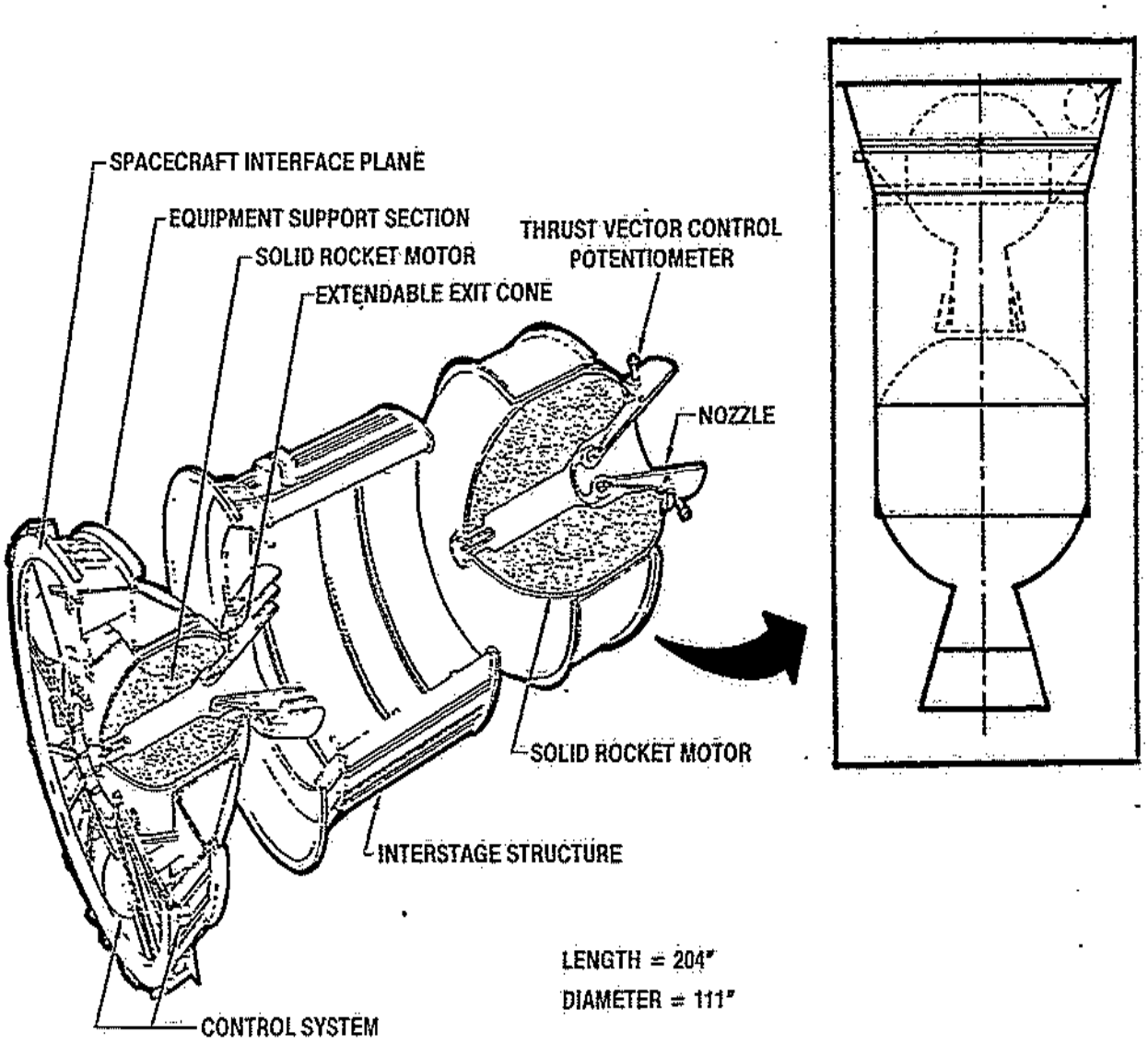
ASCENT AGENA, CONFIGURATION



TRANSTAGE CONFIGURATION

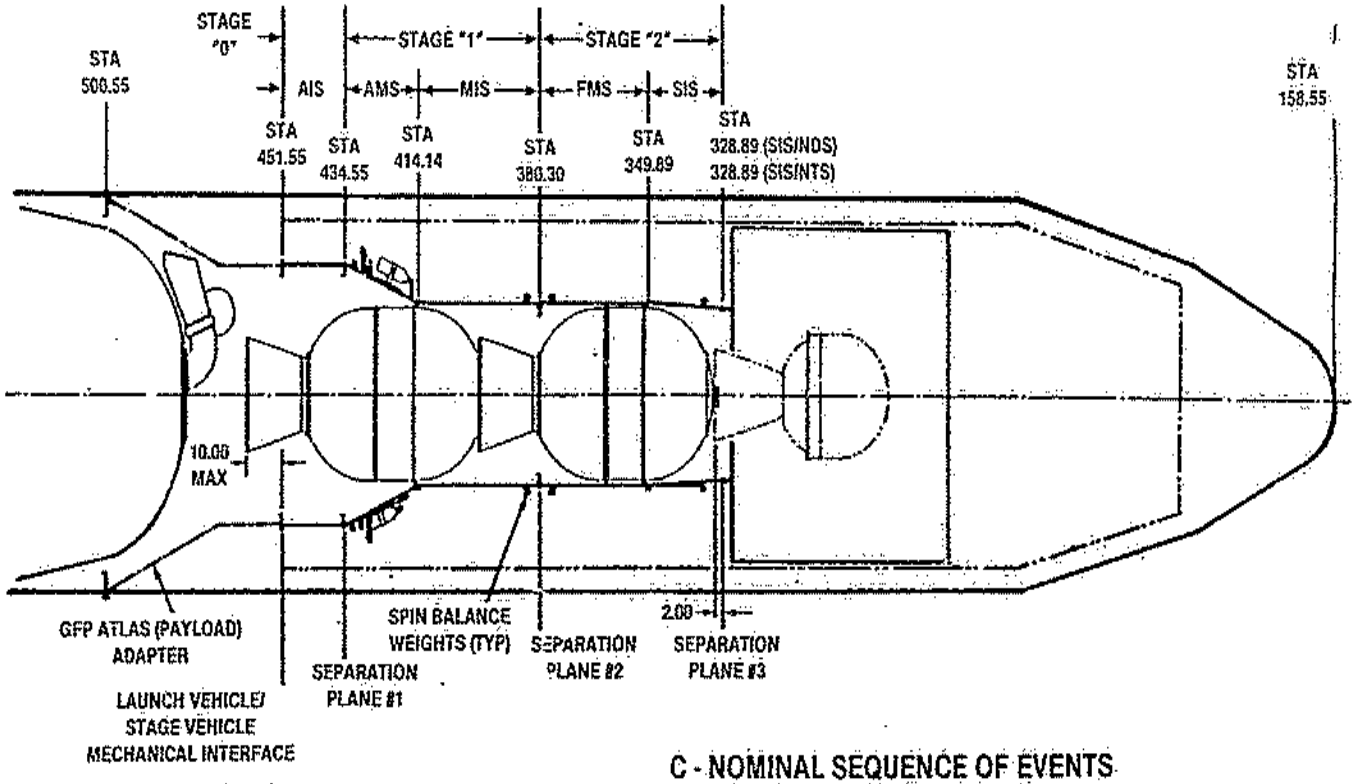


INERTIAL UPPER STAGE



GPS STAGE VEHICLE (SGS-II)

A - CONFIGURATION



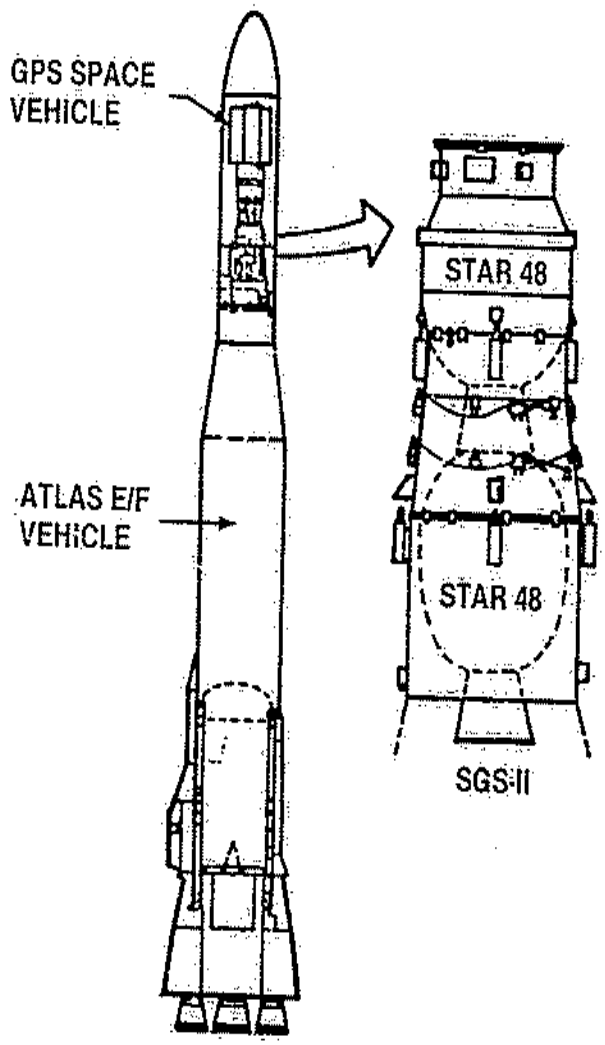
B - CONFIGURATION NOMENCLATURE

DESIGNATION	DESCRIPTION
AIS	ATLAS INTERFACE STRUCTURE
STAGE "0"	SAME AS AIS
AMS	AFT MOTOR STRUCTURE
MIS	MOTOR INTERSTAGE STRUCTURE
STAGE "1"	CONTAINS AMS AND MIS
FMS	FORWARD MOTOR STRUCTURE
SIS	SPACE VEHICLE INTERFACE STRUCTURE
STAGE "2"	CONTAINS FMS AND SIS

C - NOMINAL SEQUENCE OF EVENTS

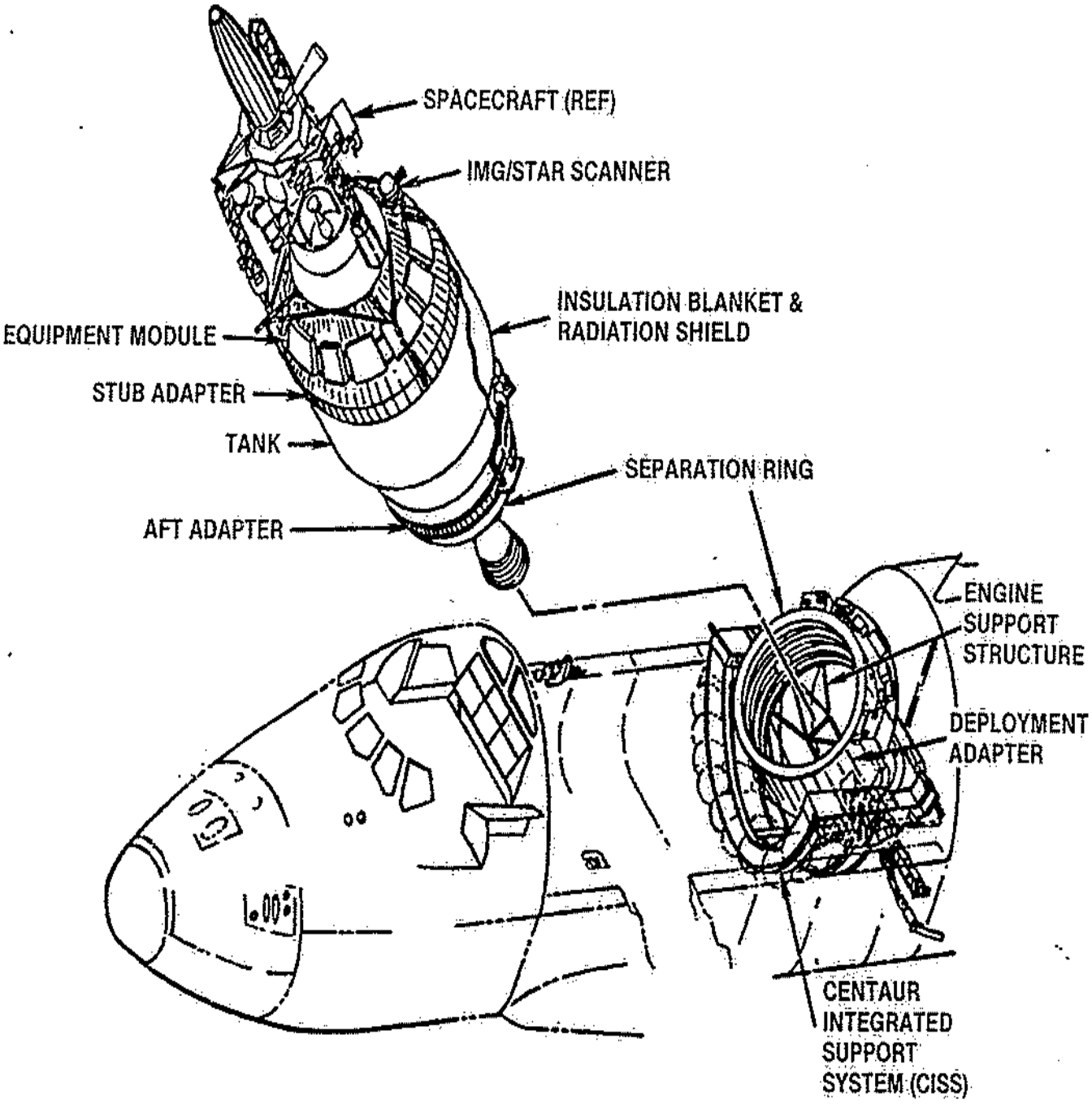
EVENT	NOMINAL TIME FROM VECO + 6 SEC (TIME P = 0)
• STAGE VEHICLE SEPARATION	0.0
• START FIRST PART SPIN-UP	0.3
• START SECOND PART SPIN-UP	0.75
• START THIRD PART SPIN-UP	1.20
• FIRST PKM IGNITION	20.0
• SEPARATE FIRST PKM STAGE	104.5
• SECOND PKM IGNITION	116.5
• SEPARATE SPACE VEHICLE	416.5

SGS-II STAGE VEHICLE

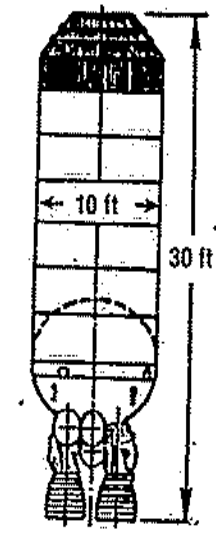


- SPIN STABILIZED SOLID ROCKET UPPER STAGE FOR ATLAS E/F FOR GPS NAVSTAR PHASE II PROGRAM
- CARRIES 1900 lb GPS TO 286 nmi x 10,900 nmi ELLIPITICAL TRANSFER ORBIT
- SPIN-OFF OF MDAC PAM-D COMMERCIAL UPPER STAGE DEVELOPMENT

SHUTTLE/CENTAUR CONFIGURATION

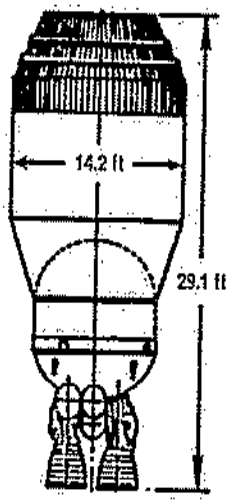


SHUTTLE/CENTAUR CONFIGURATION EVOLUTION



CENTAUR D-1
FOR ATLAS

- INCREASE LENGTH OF LO_2 TANK
- INCREASE LH_2 TANK & FORWARD STRUCTURE DIAMETER



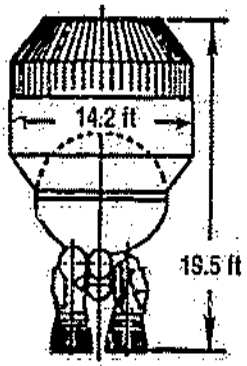
CENTAUR G
FOR SHUTTLE

MAXIMIZE COMMONALITY TO MEET NASA REQUIREMENTS

WIDE TANK APPROACH:

- USES 15-ft DIAMETER AVAILABLE IN ORBITER BAY
- INCREASES LENGTH AVAILABLE FOR SPACECRAFT
- MAINTAINS LO_2 TANK DIAMETER & PROPULSION SYSTEM UNCHANGED

- SHORTEN TANK & FORWARD STRUCTURE
- INCREASE AFT CONE ANGLE



CENTAUR G
FOR SHUTTLE

DIAGRAM OF THE DSCS II SATELLITE

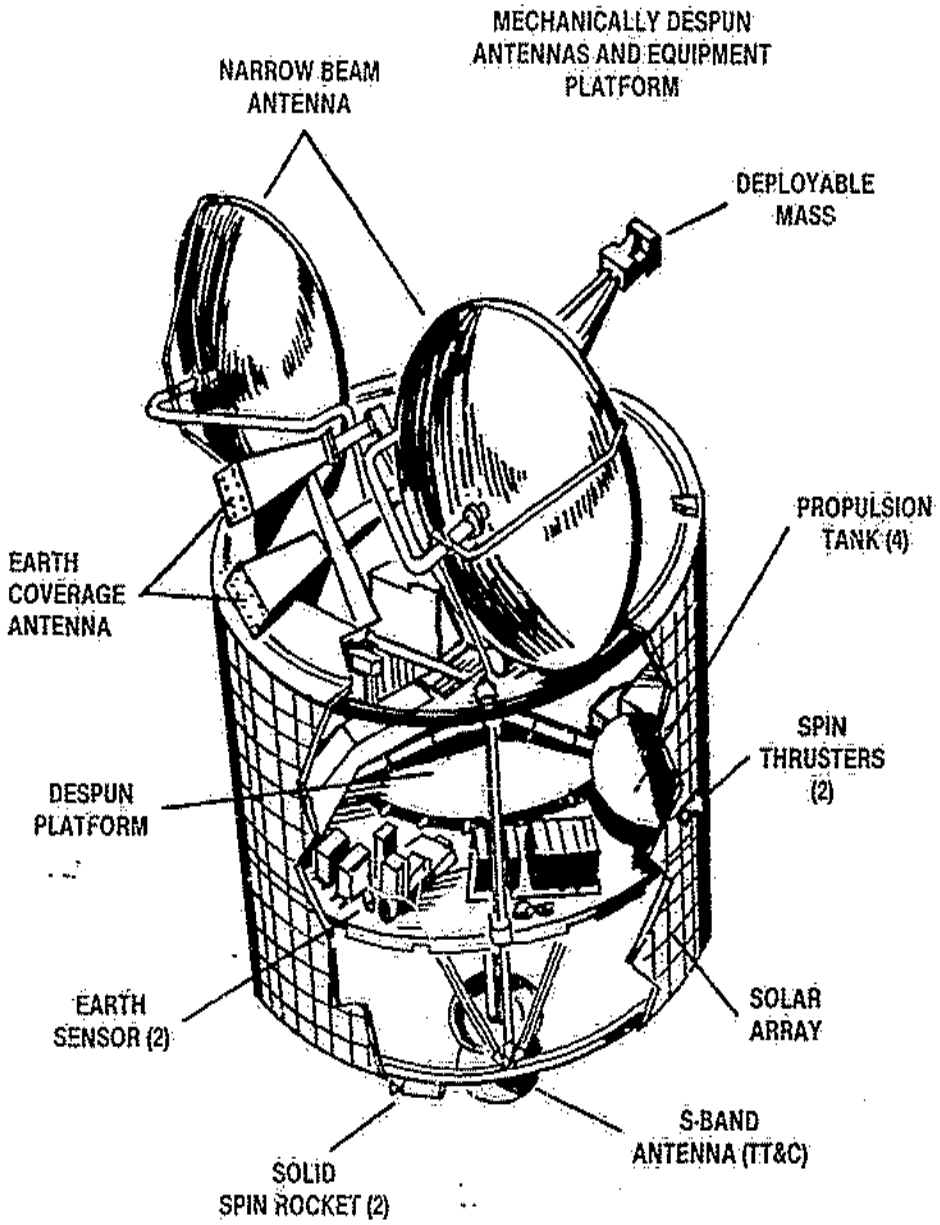
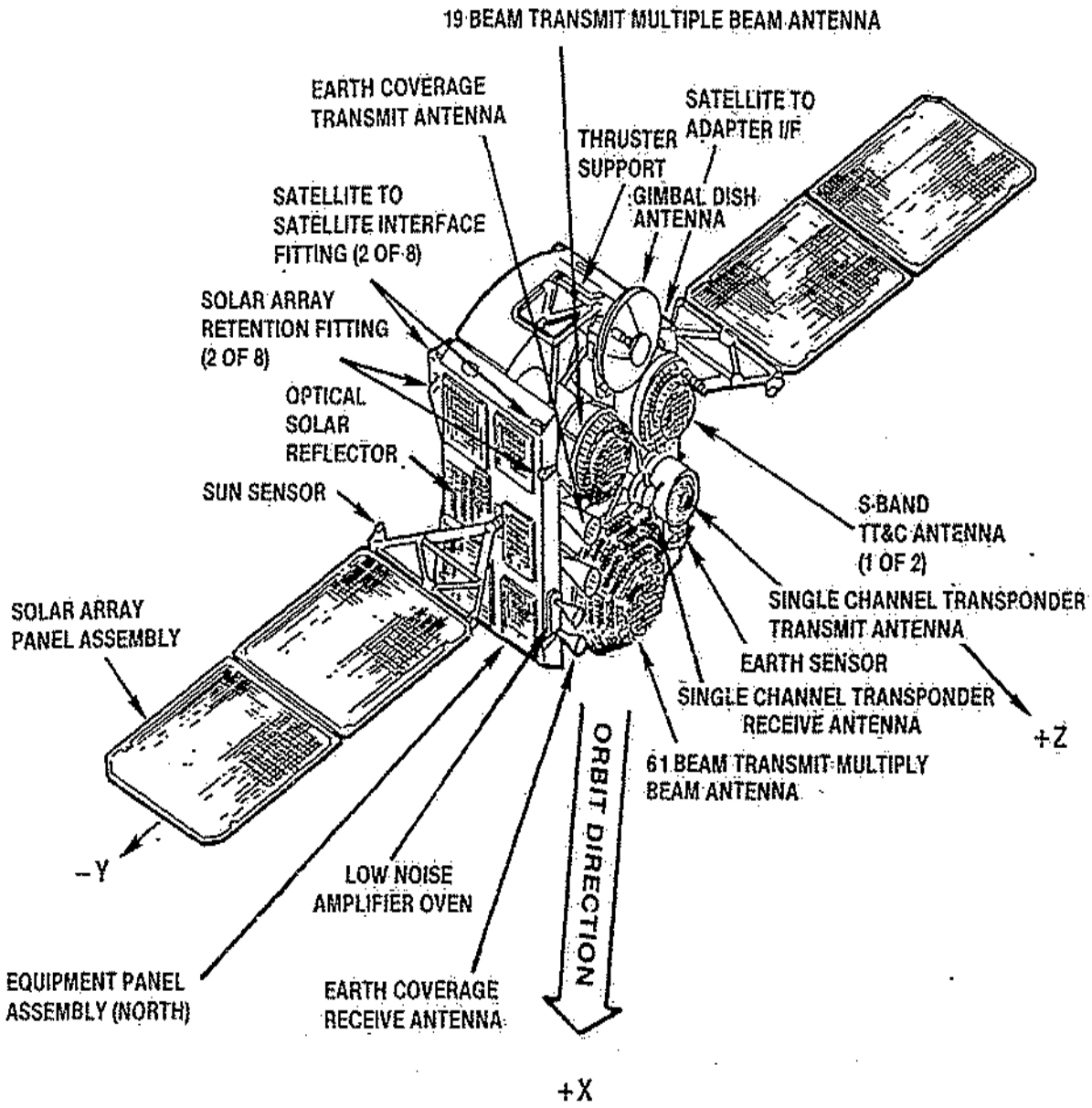


DIAGRAM OF THE DSCS III SATELLITE



(BLOCK 5D SATELLITE ILLUSTRATED)

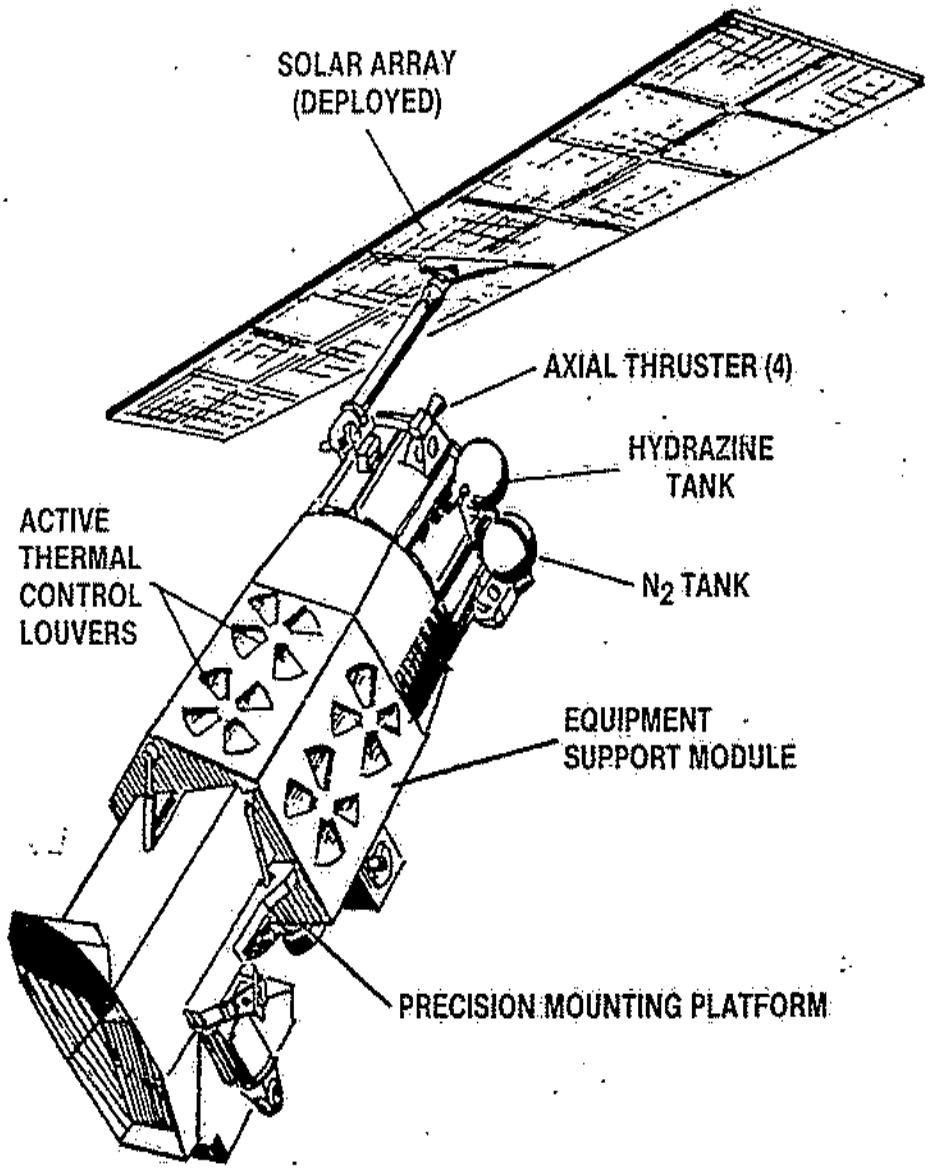


DIAGRAM OF DMSP's BLOCK 5D-1 SATELLITE.

DMSP 5 D-2 SATELLITE

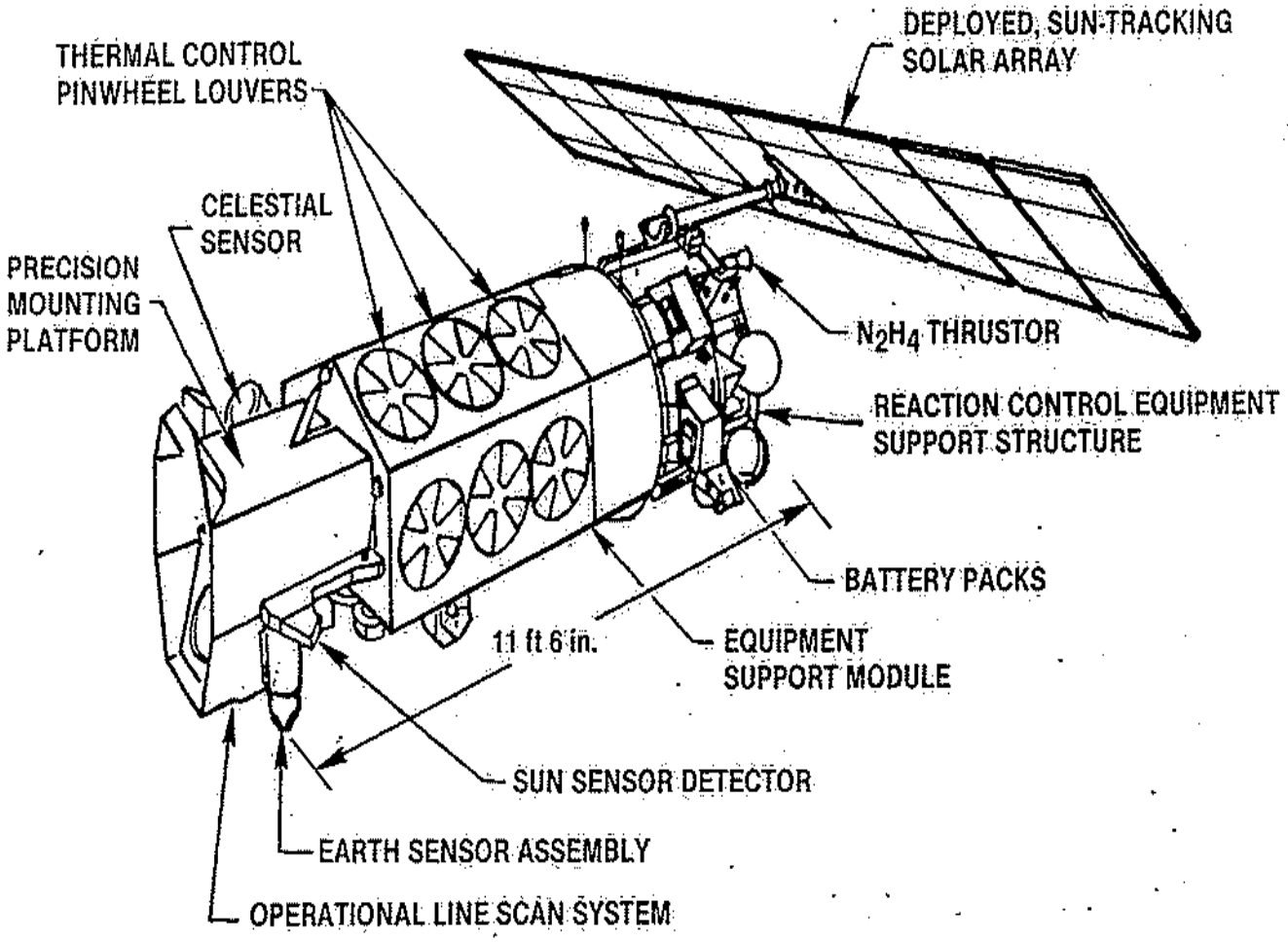


DIAGRAM OF NATO III SATELLITE

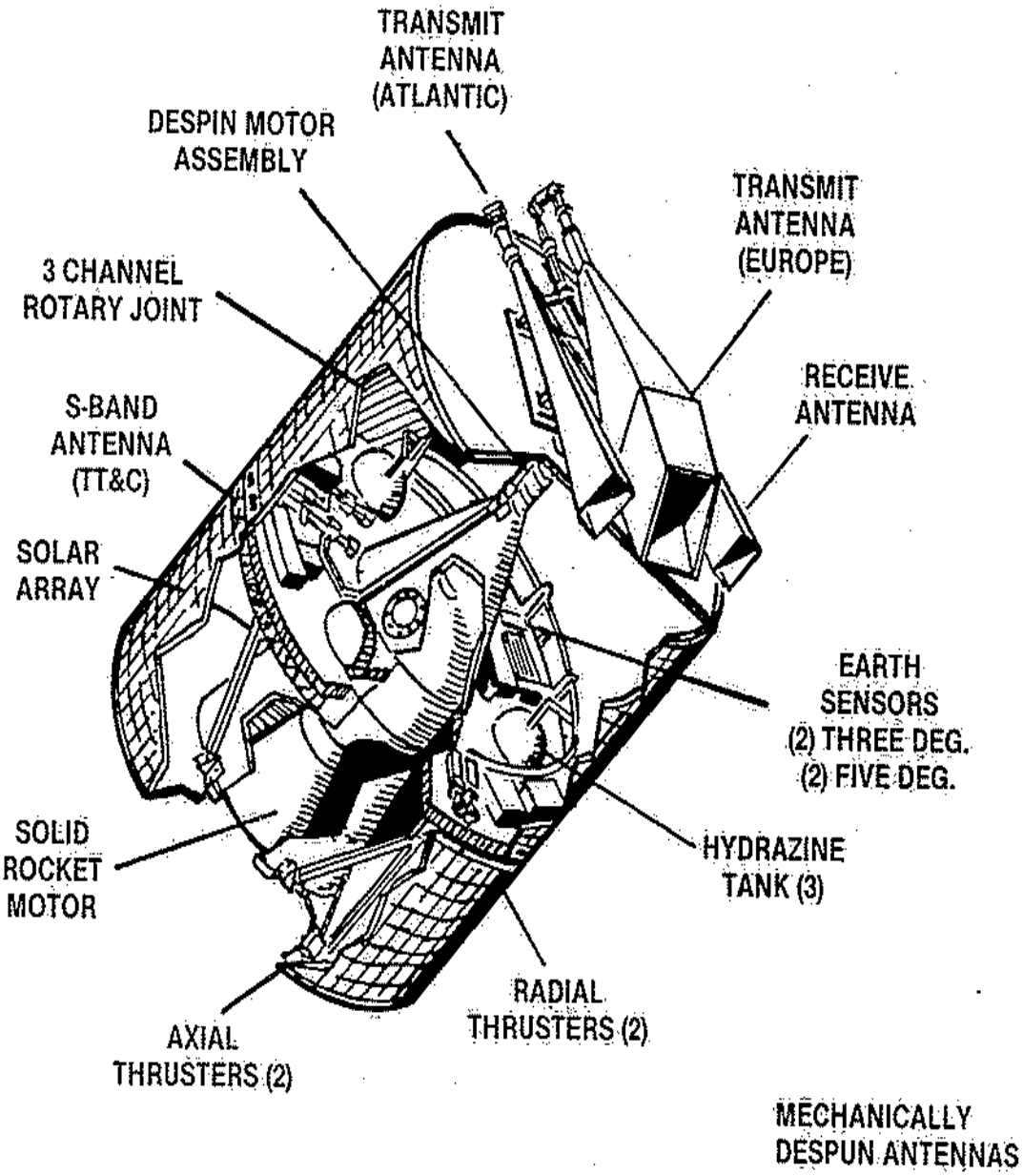
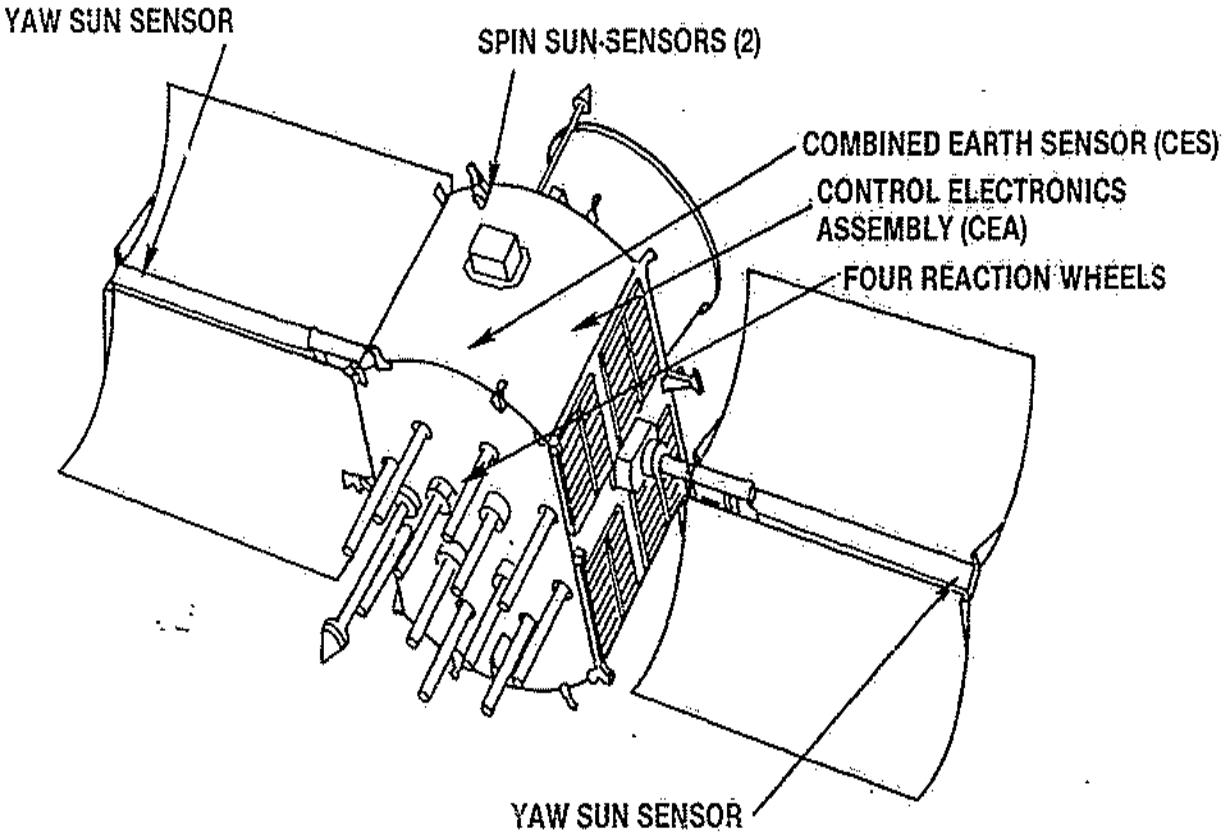
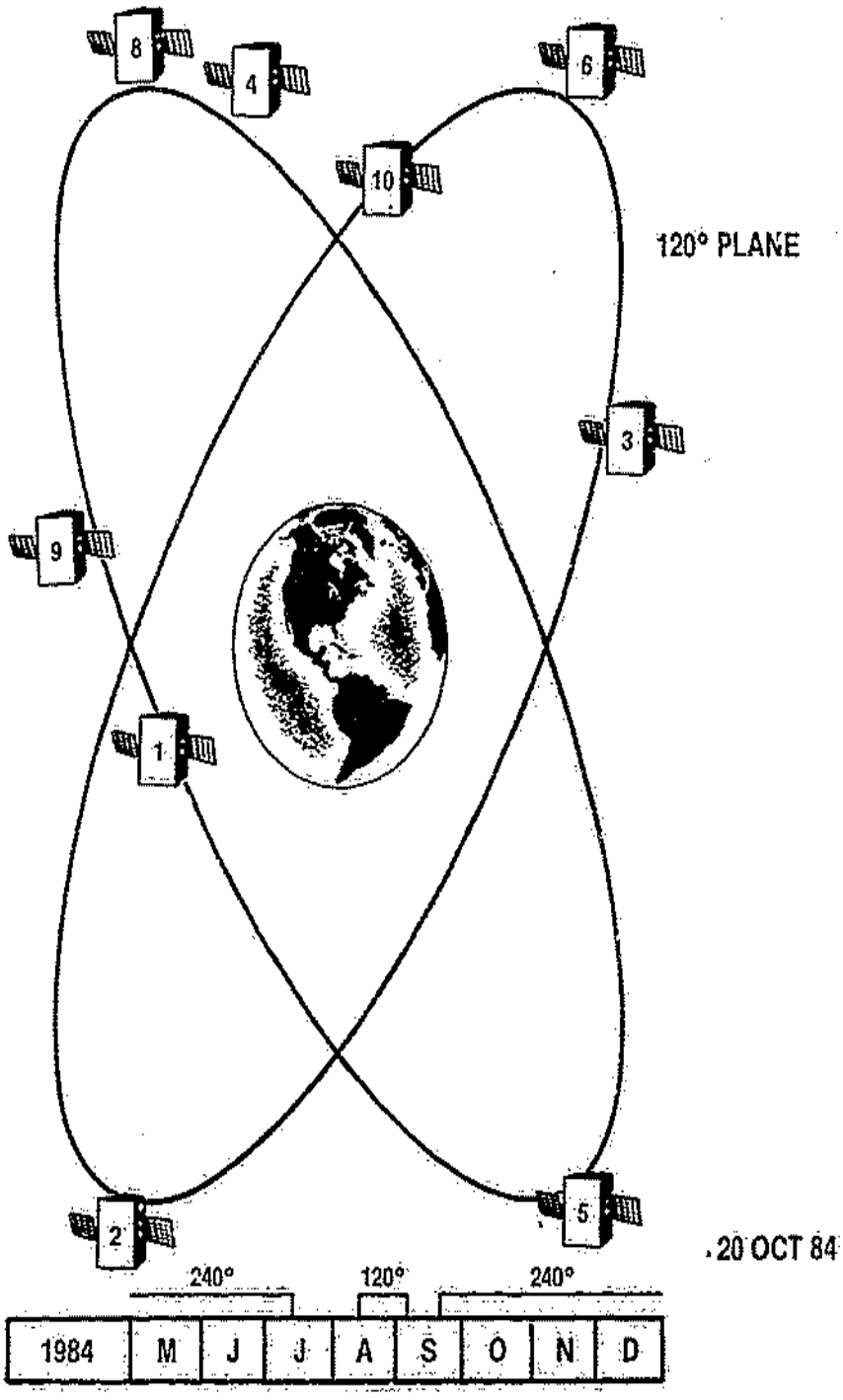
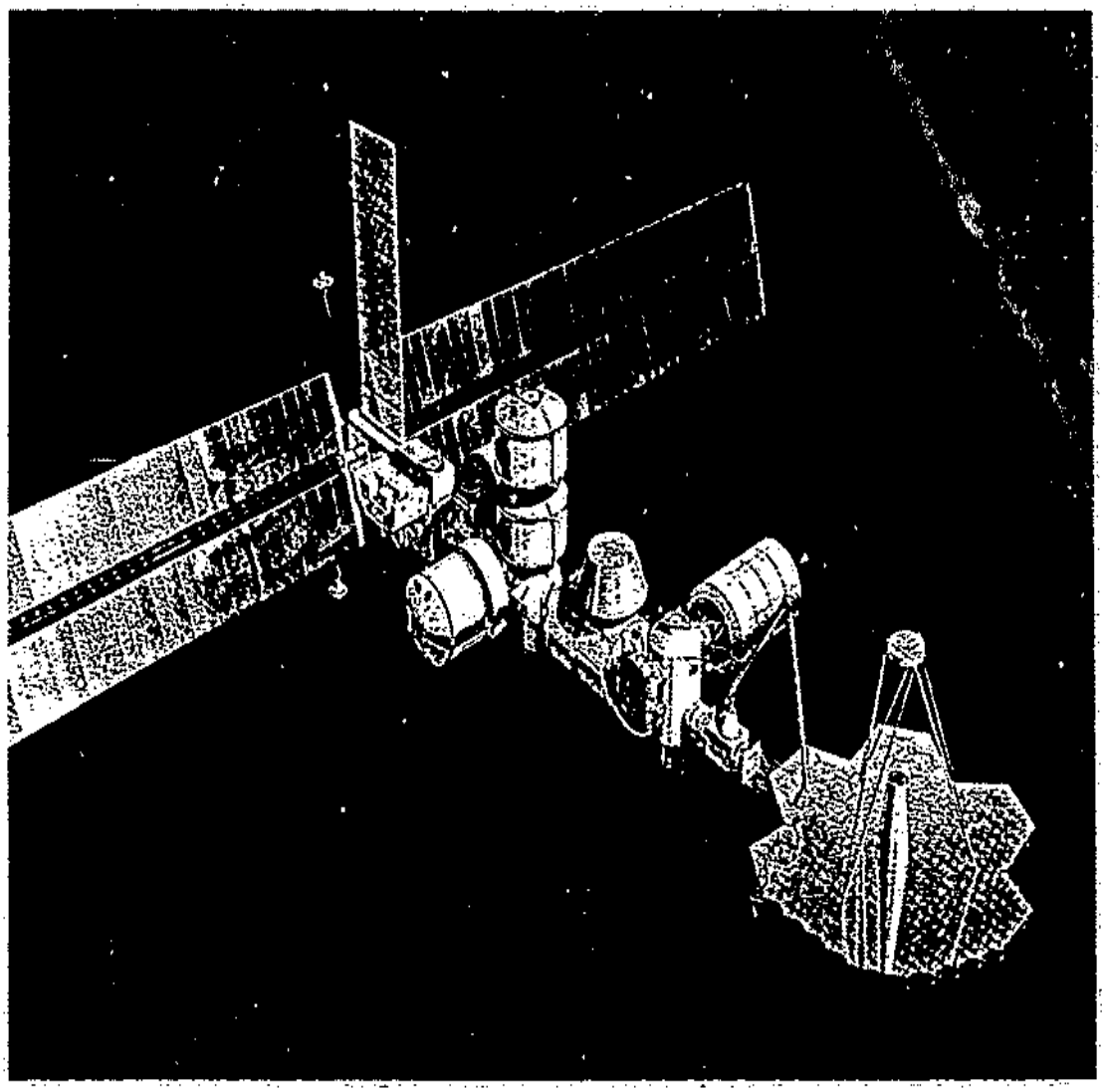


DIAGRAM OF GPS NAVSTAR SATELLITE WITH AVIONICS EQUIPMENT INDICATED.



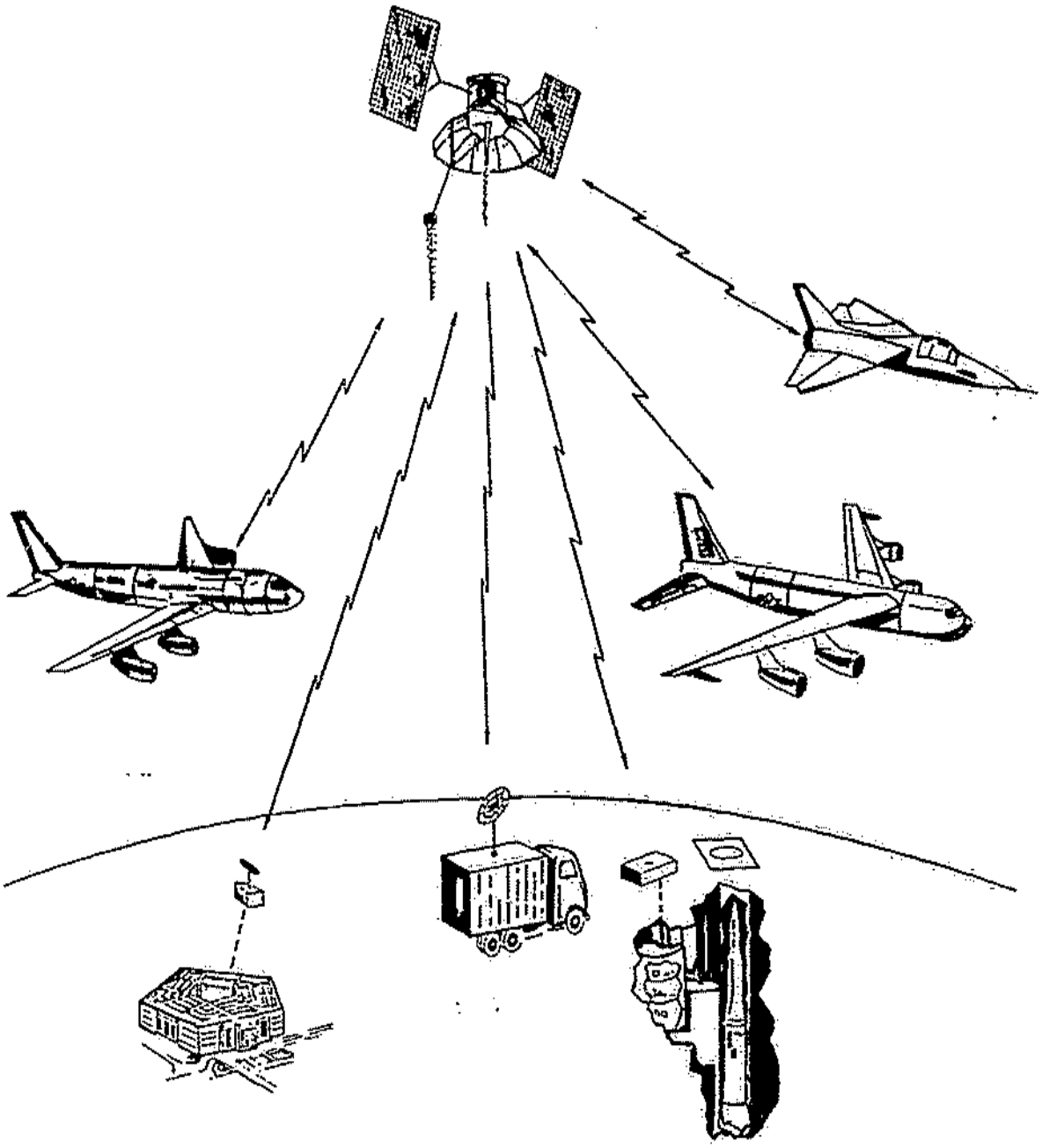
NAVSTAR GPS CONSTELLATION



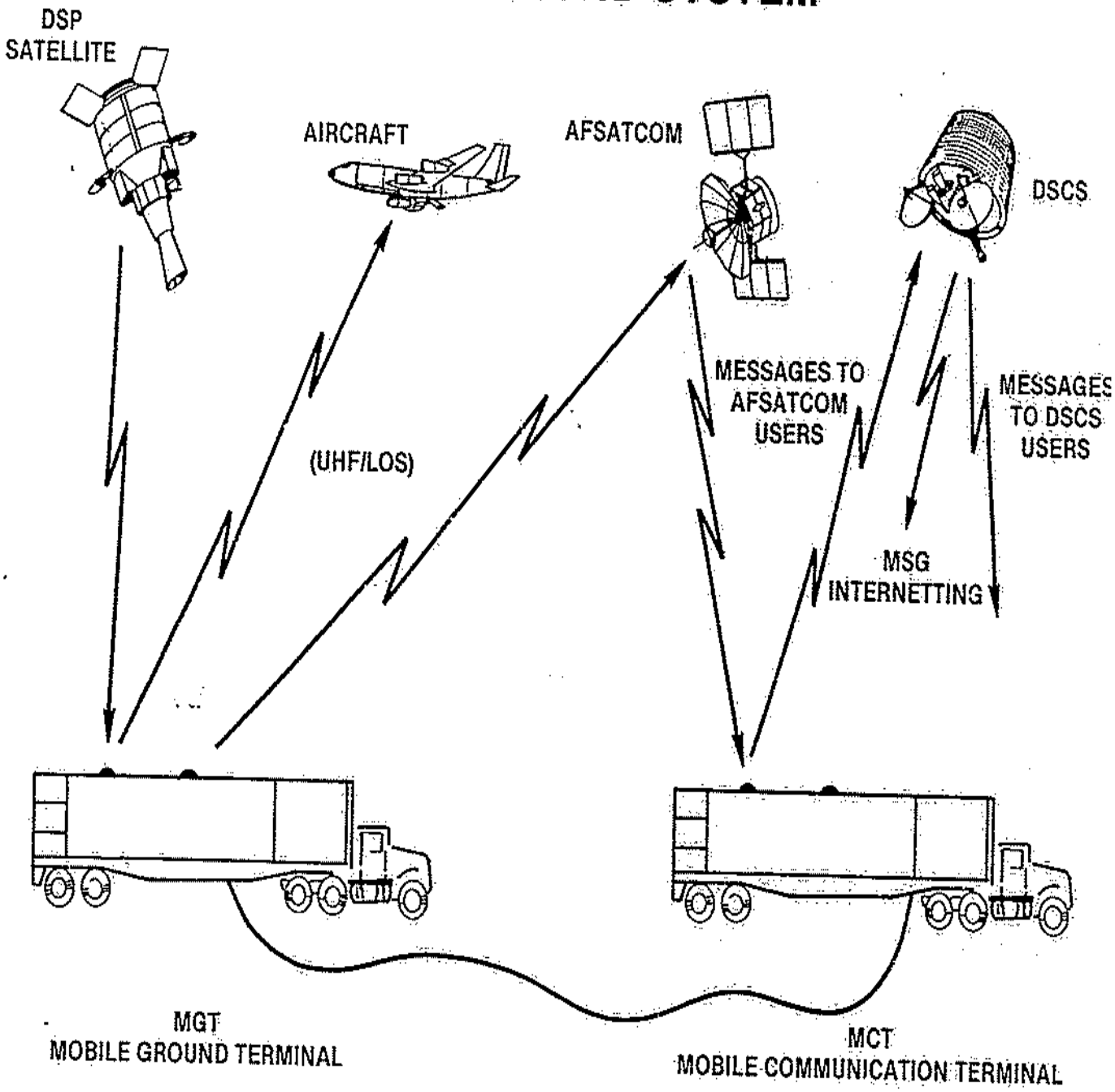


ARTIST'S CONCEPT OF SCIENCE AND APPLICATIONS MANNED SPACE PLATFORM PROPOSED BY NASA'S MARSHALL SPACE FLIGHT CENTER

AFSATCOM SYSTEM



MOBILE GROUND SYSTEM



APPENDICES

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APPENDIX ONE

LINEAGE AND HONORS

Unit Designation	Space Division (SD)
Previous Designation	Space and Missile Systems Organization (SAMSO)
Authority:	Special Order G-158, 1 October 1979
Higher HQ	Air Force Systems Command
Commander	Lt General Forrest S. McCartney
Vice Commander	Maj General Bernard P. Randolph
New Operating Locations	OL-AC (SD), Vought Corporation, P.O. Box 225907, Dallas, Texas, 21 Dec 1979, AFR 26-2, Special Order G-166
	OL-AR (SD), Hightstown/RCA, NJ 08540, 30 June 1980, AFR 26-2, Special Order G-70
	OL-AS (SD), Offutt AFB, NE 68113, 30 June 1980, AFR 26-2, Special Order G-70
	OL-AK (SD), Norton AFB, CA, 92409, 15 Feb 1980, Special Order G-17
	OL-AA (6592nd ABG), Los Angeles AFS, Annex No. 3 (Fort MacArthur), San Pedro, CA, 90733, 1 Aug 1981, AFR 26-2, AFSC Special Order G-64
	OL-AA 6595th ATC (WSMC), Edwards AFB, CA, 1 May 1982
	OL-AC Space Division, Kirtland AFB, NM, 20 July 1982
	OL-AT Space Division, Naval Electronics Systems Command, Crystal City, VA 20 July 1982
	OL-AG AFSTC, Air Force Weapons Laboratory, Golden, CO, 15 August 1982
	AFSTC OL AA, Malabar, FL, 1 Oct 82
	6595th Shuttle Test Group OL AB, Kennedy Space Center, FL, 1 Oct 82
	SD OL AC, Cleveland, OH, 1 Mar 83

	SD OL AF, Goddard Space Flight Center, MD, 1 May 83
	SD OL AG, Huntsville, AL, 30 June 83
	AFSTC OL AB, LAAFS, CA, 1 Jul 83
	AFGL OL AB, Holloman AFB, NM, 29 Jul 83
	Det 4, SD (Site Activation Task Force [SATAF]), Peterson AFB, CO 80914, 25 Nov 83
	OL-AA, AFSCF, Sunnyvale CA, 94088, 20 Jan 84
	OL-AA, SD Det 2, Johnson Space Center, NASA, Houston, TX 77058, 20 Jan 84
	Det 1, AFGL, Holloman AFB, NM 88330, 1 May 84
	OL-AC, 6595th Shuttle Test Group, Port Hueneme, CA, 93041, 1 Sep 84
Operating Locations Lost	OL-AG (SD), Marshall Space Flight Center, Huntsville, AL 35812, 7 Mar 1980, AFR 26-2, Special Order G-28
	OL-AK Ballistic Missile Office, Norton AFB, CA, 1 January 1982
	SD OL AJ, Malabar, FL, 1 Oct 82
	OL-AA (DDMS), SAMTO, Patrick AFB, FL 32935, 1 Oct 83
	OL-AB, SD, Peterson AFB, CO 80914, 25 Nov 83
	OL-AE, ESMC, Grand Turk, 31 Jan 84
	OL-AE, SD, Pentagon, Washington, DC, 21 Feb 84
	OL-AB, AFGL, Holloman AFB, NM 88330, 1 May 84
New Tenant Organizations	USACC Fort Ord ROTC USC, November 1981
	Armed Forces Examining Entrance, December 1981
	Marine Corps Camp Pendleton, January 1982
	USACC Fort Ord, January 1982
	MTMC Travis AFB, CA, June 1982
	Army National Guard, Fort MacArthur, CA, July 1982

HQ 7th Inf Div and Fort Ord, July 1982

US Post Office, Fort MacArthur, CA, July 1982

USA INSCOM, Fort MacArthur, CA, July 1982

Military Entrance Processing, June 1982

Air Force Commissary Service, September 1982

146 Tactical Airlift Wing, April 1982

Defense Criminal Investigative Service, June 1982

AFCOMS (Commissary), Oct 82

NTMC MATCU, Dec 82

Army Criminal Investigative Command, Jan 83

Military Entrance Processing Station, Jan 83

Army Ft. Ord Intelligence Unit, Jan 83

Civil Air Patrol, Jan 83

Canadian Consul, Jan 83

Postmaster, San Pedro, CA, Feb 83

Army Ft. Ord, USACC, Feb 83

Army Ft. Ord Veterinary Unit, May 83

Military Department, State of California, Feb 83

Army Ft. Ord 42 Army Units, Jun 83

Army Ft. Ord 42 Army Units, Aug 83

AF Crytologic Support Center, Aug 83

USASATCOMA, Sep 83

Space Command, Aug 84

7th Infantry Division (MEPS), Jul 84

HQ AFCMD, Jan 84

Naval Support Facility, Aug 84

	Naval Communications Station, Aug 84
	1984 Olympics Forward Military Support Element, Dec 83
	U.S. Coast Guard, Apr 84
	Army Yuma Proving Ground, Nov 83
	Defense Systems Management College, Oct 83
Tenant Organizations Lost	Army Santa Ana Recruiting Command
	63rd ADCOM
	Army Santa Ana District, Nov 82
	1984 Olympics Forward Military Support Element, Sep 84
	Army Veterinary Unit, Jun 84
Station	Los Angeles Air Force Station, Los Angeles, California
Aircraft Flown	None

EMBLEM

APPENDIX TWO

MAJOR ORGANIZATIONAL CHANGES, 1 October 1979 to 30 September 1984

org symbol	action	supporting documentation	comments
SAMSO	Space and Missiles Systems Organization discontinued, effective 1 October 1979	Msg (U), HQ AFSC, to SAMSO, SAMTEC et al., subj: "Organizational and Redesignation Changes," 011930Z Oct 79	SAMSO was changed into AFSC Space Division. Reintry Vehicle and Ballistic Missile functions were deleted from the new SD organization, and assigned to the Ballistic Missile Office, which began reporting directly to AFSC.
BMO	The Ballistic Missile Office was constituted, activated and organized at Norton AFB.	same	Assumed the functions and personnel of the Ballistic Missile and Reintry Vehicle offices.
SD	Space Division constituted, activated and organized at Los Angeles, assigned to AFSC, effective 1 October 1979.	same	Assumed the functions and personnel of SAMSO, except for BMO functions
SD/YO	Deputy Commander for Space Operations established, effective 1 September 1980	Ltr (U), Det 27/CC to SD/DCSO, subj: "Establishment of DCSO," 2 Sept 80; Action Plan--DC/SO Activation (U), Engineering and Payload Integration (no date)	Established to implement AF space operations responsibilities in matters concerning the Space Transportation System and the command and control of DoD satellites
Det 29/ SATAF	SD Detachment 29 Site Activation Task Force disestablished, effective 1 Oct 79	AFSC SO G-158, 1 Oct 79	Transferred to BMO as Det 1, effective date 1 October 79
Det 31/ SATAF	SD Detachment 31 Site Activation Task Force disestablished, effective 1 Oct 79	same	Transferred to BMO as Det 2, effective date 1 October 79
SD/Det 2	SD/Detachment 2 Manned Space Flight Support Group disestablished, effective 1 Sep 80	Hist Rpts (U), SD/YO, 6 Oct 80	Began reporting to SD Commander through the Dep Cdr for Space Operations

APPENDIX TWO

MAJOR ORGANIZATIONAL CHANGES, 1 October 1979 to 30 September 1984

org symbol	action	supporting documentation	comments
SAMTEC	Space and Missile Test Center disestablished, effective 1 Oct 79	AFSC SO G-158, 1 Oct 79	SAMTEC redesignated Space and Missile Test Organization (SAMTO) and reorganized ito HQ WSMC and HQ ESMC. The change was the result of effort to streamline the organizational structure of East and West Coast operations, after the addition of the 6550th ABW and the USAF Hospital/Patrick
SAMTO/HQ WSMC	Western Space and Missile Center, established and assigned to SAMTO, effective 1 Oct 79	same; AFSC SO G-158, 1 Oct 79	same; assumed functions of SAMTEC, 6595th Aerospace Test Wing, which was disestablished
SAMTO/HQ ESMC	Eastern Space and Missile Center established, and assigned to SAMTO, effective 1 Oct 79	same; AFSC SO G-159, 1 Oct 79	same; assumed duties of SAMTEC/Det 1; took control of 6550th ABW from HQ AFSC, USAF Hospital, Patrick, from 6550th ABW, and 6555th ATG from 6595th ATG
SAMTEC/ 6595th ATW	Space and Missile Test Center, 6595 Aerospace Test Wing disestablished, effective 1 Oct 79	AFSC 20 G-158, 1 Oct 79	Functions and personnel transferred to HQ WSMC
SAMTEC/ Det 1	Detachment 1 disestablished, effective 1 Oct 79	same	Functions and personnel transferred to HQ ESMC
SD/YKM	MILSTAR System Program Office established effective 25 June 1981	Msg (U) SD/CV to AFSC/CV, subj: "MILSTAR Program Office Manning," 13 Nov 81	Established to emphasize and better manage the development of strategic and tactical two-way satellite communications
SD/Det 1	Space Division Detachment 1, (Shuttle Activation Task Force) activated effective 1 Sep 81	SO G-82, 26 Aug 81 (U) AFSC/DA; ltr (U), Det 27/CC to Det 1/CC, subj: "Establishment of SD Det 1, Shuttle Activation	Established for on-site management of Vandenberg launch site construction for STS

APPENDIX TWO

MAJOR ORGANIZATIONAL CHANGES, 1 October 1979 to 30 September 1984

org symbol	action	supporting documentation	comments
		Task Force," 11 Sep 81	
SD/CF	Deputy Commander for Launch and Control Systems Acquisition established effective 1 Jun 82.	Ltr (U) Det 27/CC to 6592/DA, "Office Symbols," 2 Jun 82 Msg (U), DTG 030100Z Jun 82, subj: "Space Division Revised Organizational Structure"	Part of internal reorganization designed to reduce the SD Commander's span of control, delegation of authority and responsibility
SD/CG	Deputy Commander for Space Systems Acquisition established effective 1 Jun 82.	same	same
SD/CL	Deputy Commander for Launch Operations/Commander Space and Missile Test Center established effective 1 Jun 82.	same; Ltr (U) SD/CC to Commanders and Chiefs of Major Staff Offices, "Reorganization of HQ Space Division," 27 May 82	same
SD/YA	MILSTAR/AFSATCOM Joint Program Office established effective 1 Jun 82.	Ltr (U) SD/CC to AFSC/CC, subj: "Space Division Organization," 16 Apr 82; Organizational Charts (U), June and July 82; Ltr (U), SD/CC to Commanders and Chiefs of Major Staff Offices, subj: "Reorganization of HQ Space Division," 27 May 32; Ltr (U), Det 27/CC to 6592 ABG/DA, subj: Office Symbols, 2 Jun 82; Msg (U)DTG 030100Z Jun 82, subj: "Space Division Revised Organizational Structure"	Office symbol changed from SD/YKM to SD/YA as part of a reorganization creating CF, CG, CL and CR
STC	Air Force Space Technology Center activated and command assumed by Col. Bob L. Francis 1 Oct 82.	Report (draft), Management Plan for Space Division Management and Control of the AF Geophysics Laboratory, AF Rocket Propulsion Laboratory and AF Weapons Laboratory Assets of the SD Space Technology	Center created to act as focal point manager for three labs: AF Geophysics, Weapons and Rocket Propulsion. Personnel were transferred from SD Deputate of Technology, which was inactivated subsequently. The

APPENDIX TWO

MAJOR ORGANIZATIONAL CHANGES, 1 October 1979 to 30 September 1984

org symbol	action	supporting documentation	comments
		Center, 20 Jul 82; Ltr, C. Henry, SD/CC, to Al, A5, subj: Key Personnel Changes, 30 Jul 82; Proposed AFSTC Organizational Charts as of 3 Aug 82; Implementation Plan 82-1 (AFSTC), Activation of the Air Force Space Technology Center (prep by SD), 10 Sep 82; AFSC SO G-135, 15 Sep 82; AFSTC SO G-1, 1 Oct 32; AFSC Program Action Directive (PAD), Activation of the Air Force Space Technology Center (prep AFSC), 15 Jul 82; Organization and Functions Chart Book, Air Force Space Technology Center, KAFB, NM (prep. by AFSC MET); AFSC SO G-49, 7 Jun 83; AFSC SO G-99, 15 Jul 82; ltr, Lt Gen Richard C. Henry, SD/CC, to Al, A5, subj: Key Personnel Changes, 13 Aug 82; msg, SD to HQ AFSC, subj: Space Technology Center (STC) Manning, 031730Z Sep 82	Center Commander became the fourth deputy commander of SD.
SD/YC	Space Test Program Office redesignated and attached to Deputy for Space Defense Systems effective 1 Nov 82.	Ltr (U), YC to Distribution, subj: "Space Test Program Office Reorganization," 18 Nov 82; Ltr (U), SD/YC to SD/YCC/YCM/YCR/Det 1, STC/CC, SD/YNO, subj: "SD/YC Organizational Titles," no date; Ltr (U), YC to Det 27, subj: "Space Test Program (STP) Reorganization," 19 Nov 82	SD retained this office when it transferred most of the resources of YL (Deputy for Technology) to the Space Test Center. The new office drew mission support from SD/YN (Space Defense Systems). YC had three Divisions, Spacecraft Engineering, Teal Ruby, and Mission and Operations.

APPENDIX TWO

MAJOR ORGANIZATIONAL CHANGES, 1 October 1979 to 30 September 1984

org symbol	action	supporting documentation	comments
SD/YL	Deputy for Technology disestablished effective 1 Oct 82.	Ltr (U), YC to Distribution, subj.: "Space-Test Program Office Reorganization," 18 Nov 82	Elements of disbanded office assigned to Space Test Center at Kirtland AFB, NM, to form the new organization of the AF Space Technology Center
SD/YO	Deputy Commander for Space Operations disestablished effective 1 Mar 83	Ltr (U), CS to Distribution, subj: "Space Division Organizational Changes," 18 Feb 83; Msg (U), DTG 130001Z subj: "Space Division Reorganization"; Organizational Charts (U), Jan, Mar 83; Ltr (U), Det 27 to YO, subj: "Reorganization of YO," 17 Mar 83	Functions performed by Space Operations were transferred to the Deputy Commander for Launch and Control Systems to provide single-point contact with Air Force Space Command on STS and satellite control activities, central management and CSOC program offices, and a one-on-one interface with Johnson Space Center. On 17 Mar 83, the name of the office changed to Deputy for Mission Integration. Office name changed to reflect nature of organizational responsibilities.
SD/YR	Satellite Data Systems Program office deactivated effective Aug 83.	Organizational Charts (U), Jul 33 interview (U), L. Levack, History Assistant, with Joan Rhodes, Det 27, 16 May 84	Deletion due to completion of SDS program mission
SD/YK	Deputy for Space Communications Systems disestablished effective 11 May 84	Ltr (U), SD/CC to Distribution, subj: "Reorganization of Deputy Commander for Space Systems," 11 May 84; Staff bulletin, 1 Jun 84	Removal of this office from SD/CV responsibilities.
SD/CG	Deputy Commander for Space Systems established effective 14	Ltr (U), SD/CC to Distribution, subj: "Reorganization of	Part of reorganization of Deputy Commander for Space Systems; general

APPENDIX TWO

MAJOR ORGANIZATIONAL CHANGES, 1 October 1979 to 30 September 1984

org symbol	action	supporting documentation	comments
	May 84	Deputy Commander for Space Systems," 11 May 84; Staff Bulletin #41, dated 1 Jun 84, item 12.	officer position reassigned from Deputy for Space Communications Systems to Deputy Commander for Space Systems
SD/CR	Assistant for Strategic Defense Initiative established effective 25 Apr 84.	Staff Summary Sheet (U), subj: "Establishment of Assistant for Strategic Defense Initiative," 7 May 84; Draft Msg (U), SD/CC to AFSC/CV/XR et al., subj: "Strategic Defense Program (SDP) Management," 252200Z	Established to coordinate Space Defense Initiative efforts within Space Division and other AFSC organizations, and to act as liaison with other DoD agencies and the SDIO.

PPENDIX THREE

AIR FORCE SYSTEMS COMMAND SPACE DIVISION
COMMANDERS, VICE-COMMANDERS AND CHIEFS OF STAFF

title	rank/name	dates
SPACE DIVISION		
Commander	Lt. Gen. Richard C. Henry	28 April 1978-1 May 1983
	Lt. Gen. Forrest S. McCartney	1 May 1983-30 September 1986
Vice Commander	Maj. Gen. Gerald K. Hendricks	1 July 1978-1 June 1982
	Maj. Gen. Forrest S. McCartney	1 June 1982-1 May 1983
	Maj. Gen. Bernard P. Randolph	1 May 1983-10 June 1984
Chief of Staff	Col. Gerald K. Dahmen	1 June 1979-31 March 1981
	Col. James V. Saravo	1 April 1981-10 January 1983
	Col. Edward L. Heinz	10 January 1983-5 July 1984
	Col. Jimmie H. Butler	5 July 1984-28 Febuary 1987
SUBORDINATE UNITS		
ir Force Rocket Propulsion Laboratory		
Commander	Col. William Morris	October 1980-June 1981
	Col. Don A. Hart	June 1981-6 August 86
Air Force Geophysics Laboratory		
Commander	Col. James E. Baker	31 July 1979-13 June 1981
	Col. John Friel	1 September 1981-7 October 1983
	Col. Gerald P. D'Arcy	7 October 1983-15 June 1984
	Col. Joseph D. Morgan III	15 June 1984-18 July 1985
Space and Missile Test Organization (SAMTO)		
Vice Commander	Col. John F. Bayland	31 August 1979-23 October 1979
	Col. William J. Sparkman	23 October 1979-4 July 1980
Commander (Space Division Deputy Commander for Launch Operations)	Brig. Gen. William T. Twinting	4 July 1980-16 November 1982
	Brig. Gen. Donald W. Henderson	16 November 1982-1 July 86
Air Force Weapons Laboratory		
Commander	Dr. William L. Lehmann	1 July 1978-28 February 1981
	Col. Robert L. Francis	1 March 1981-1 October 1982
	Col. Tony M. Johnson	1 October 1982-1 July 1984
	Col. James M. Walton	1 July 1984-31 May 1986
Eastern Space and Missile Center		
Commander	Col. John S. Burkland	1 October 1979-30 April 1981
	Col. Marvin L. Jones	30 April 1981-31 December 1984
Western Space and Missile Center		
Commander	Col. William M. Burkett	1 October 1979-31 May 1981
	Col. William J. Murphy	1 June 1981-27 July 1983
	Col. L.L. Gooch	27 July 1983-30 April 1986

APPENDIX THREE

AIR FORCE SYSTEMS COMMAND SPACE DIVISION
COMMANDERS, VICE-COMMANDERS AND CHIEFS OF STAFF

title	rank/name	dates
Air Force Satellite Control Facility (AFSCF)		
Commander	Col. Joe E. Sanders	1 March 1979-31 March 1982
	Col. Floyd R. Stuart	31 March 1982-17 May 1985
Air Force Space Technology Center		
Commander	Col. Bob Francis	1 October 1982-1 June 1984
	Col. J. Friel	1 June 1984-30 April 1986

APPENDIX FOUR

PERSONNEL STATISTICS

organization	date	military officer authorized	military officer assigned	military enlisted authorized	military enlisted assigned	civilian authorized	civilian assigned	total authorized	total assigned
SPACE DIVISION	30 Sept 1979	1771	1666	1336	1287	2173	2029	5280	4982
SD/HQ		1103	998	303	266	1109	1032	2515	2296
SD/AFSCF		326	333	834	821	310	285	1470	1439
SD/SAMTO		342	335	199	200	726	695	1267	1230
OTHER SD		0	0	0	0	28	17	28	17
SPACE DIVISION	30 Sept 1980	1786	1642	1975	1955	2861	2685	6622	6282
SD/HQ		973	852	305	260	919	877	2197	1989
SD/AFSCF		324	309	824	818	312	295	1460	1422
SD/SAMTO		489	481	846	877	1615	1499	2950	2857
OTHER SD		0	0	0	0	15	14	15	14
SPACE DIVISION	30 Sept 1981	1947	2010	1746	2155	2685	2809	6378	6974
SD/HQ		1082	1042	323	324	999	831	2404	2197
SD/AFSCF		331	324	825	814	314	316	1470	1454
SD/SAMTO		522	475	597	803	1330	1588	2449	2866
OTHER SD		0	0	0	0	17	17	17	17
SPACE DIVISION	30 Sept 1982	1862	1931	2021	2046	2950	2843	6833	6820
SD/HQ STAFF		180	183	252	241	605	582	1037	1006
SD/LAUNCH & CONTROL SYSTEMS<1>		267	284	19	39	136	132	422	456
SD/SPACE OPERATIONS		451	472	842	813	338	347	1631	1632
SD/SPACE SYSTEMS		439	475	38	28	177	175	654	678
SD/SAMTO<2>		525	517	870	925	1676	1579	3071	3021
OTHER SD		0	0	0	0	13	14	18	14
SPACE DIVISION	30 Sept 1983	2707	2756	2558	2614	4341	4156	9606	9526
SD/HQ STAFF		200	203	283	293	619	590	1102	1096
SD/LAUNCH & CONTROL SYSTEMS<1>		805	812	895	890	462	454	2162	2156
SD/SPACE SYSTEMS		484	525	47	47	197	196	728	768
SD/SAMTO<2>		624	659	933	981	1746	1628	3303	3268
SD/AFSTC		594	557	400	403	1380	1274	2294	2234
OTHER SD		0	0	0	0	17	14	17	14
SPACE DIVISION	30 Sept 1984								
SD/HQ STAFF		225	216	306	283	645	607	1176	1111
SD/LAUNCH & CONTROL SYSTEMS<1>		940	869	906	871	528	445	2374	2185
SD/SPACE SYSTEMS		575	552	50	47	215	210	840	809
SD/SAMTO<2>		669	753	949	967	1716	1725	3334	3445
SD/AFSTC		576	622	393	390	1270	1203	2239	2215
OTHER SD		0	0	0	0	16	18	16	18

<1> includes AFSCF <2> includes Launch Operations

APPENDIX FIVE

SELECTED MAJOR CONSTRUCTION PROJECTS

project title	description	design dev award date	designer firm	construct award date	constrct start date	occupancy date	contractor firm
LOS ANGELES AIR FORCE STATION							
Commissary	Construct new commissary facility at LAAFS	11/05/80	Leidenfrost-Norowitz	3/16/82	03/23/82	07/21/83	C.V. Holder
Child Care Center	Construct new child care facility at LAAFS	08/18/82	Albert/ Wurzburger Architects	09/13/84	09/15/84	12/27/86	C. V. Holder
CONSOLIDATED SPACE OPERATIONS CENTER (CSOC) (Colorado Springs)							
Phase 1	Site preparation: site improvement, roads, parking, curbs and gutters, utilities, utilidor tunnel, water storage tanks, water pump house	03/04/81	Holmes & Narver, Inc.	05/05/83	05/06/83	08/16/84	Schmidt-Tiago
Phases 1 and 2	Facilities: technical building, central plants, sewage lagoon, pump house, security, electric, gas	03/04/81	Holmes & Narver, Inc.	02/09/84	02/09/84	09/26/85	Bechtel National, Inc. Cherokee Water, Mtn View Electric, People's Gas
Phase 3	Facilities: technical building, central plant structure, sewage lagoons, pump house, electrical substation, security fence	03/01/81	Holmes & Narver, Inc.	09/30/85	10/21/85	08/31/87 (est)	Nicolas Construction Co
Phase 4	User requirement changes, design deficiencies (cleanup for phases 1 and 2) complex	N/A	Holmes & Narver, Inc.	04/09/86	04/15/86	04/20/86	Sides Construction Co.
FORT MACARTHUR HOUSING PROJECT							
Phase II	build 200 townhome-type units at Ft. MacArthur	06/04/80	SD/Civil Engineering	09/30/81	11/04/81	03/11/83	Turnkey Design & Construction
Phase III	build 170 townhome-type units at Ft. MacArthur	04/09/83	Gibbs & Gibbs	10/22/83	03/08/84	12/01/85	Turnkey Design & Construction
Unaccompanied Officer Personnel	Alter UOPH (bldgs 33-36)	04/22/82	Albert & Wurzburger	05/31/83	07/11/83		Mantikas Construction

APPENDIX FIVE

SELECTED MAJOR CONSTRUCTION PROJECTS

project title	description	design dev award date	designer firm	construcc award date	constrct start date	occupancy date	contractor firm
Housing							Co.
Transient Lodging Facilities	Alter TLF	02/02/81	Fernando Juarez & Associates	06/20/85	06/26/85	05/30/86	Circle "N"
SATELLITE CONTROL FACILITY AND SUNNYVALE AFB							
Mission Control Complex		02/17/81	King Reif Associates	02/12/82	02/27/82	09/11/84	Dickman Builders
Data Systems Modification	Phase 1	09/01/82	Rasmussen, Ingle & Anderson	05/10/83	08/01/83	03/01/85	Neil D. Feinstein
Data Systems Modification	Phase 2	01/03/81	Rasmussen, Ingle & Anderson	03/31/83	05/31/83	06/30/85	Bruce Anderson Construction
MIOCONUS Tracking Station	Peterson AFB, CO	09/01/83	Holmes & Narver	04/12/85	04/12/85	10/28/86	Nicholas Construction Co.
MISCELLANEOUS PROJECTS							
DMSP	Command and Control Facility	06/20/83	TSG Architects	03/08/85	04/02/85	06/01/87 (est)	Donald M. Drake Co.
ASAT	Antisatellite System Facilities (Langley AFB)	09/26/83	MMM Design Group; Booker Associates	design completed; no Congressional authorization for construction			
ADAL	Aerospace Data Facility (Phases 1-3)	03/15/81	ARIX; Stearns Catalytic Corporation; Miner & Miner Engineers	09/14/82	10/20/82	06/16/84	Northern Electric; PCL Construction Limited
Range Safety Processing Center	Vandenberg AFB	08/17/81	Pacific Architects Collaborative	02/01/83	03/28/83		Brinager and Fuller, Inc.

APPENDIX FIVE

SPACE TRANSPORTATION SYSTEM CONSTRUCTION

project title	facility purpose/description	design dev award date	design firm	constr'n start date	occupancy date	contractor firm
T 34 D	Titan III Resiting	04/10/87	COE (Sacramento)	02/25/80	12/06/80	Cardan Co.
STS V-17	Airfield Landing Strip	01/19/77	COE (Sacramento)	01/08/82	08/01/83	Joint Venture: Ball & Ball; Brosamer, Inc.
STS V-18	Orbiter Launch Facility (Mate/Demate Facility)	08/15/80	Dreyfuss and Blackford	06/24/81	11/16/81	James C. Cushman
STS V-19	Orbiter Maintenance Checkout Facility pkg I	11/20/78	OMJM	03/24/80	11/07/80	Santa Fe Engineering
STS V-19	Orbiter Maintenance Checkout Facility pkg II	11/20/78	OMJM	11/20/80	05/20/84	Continental Heller Corp.
STS V-21	Hypergolic Maintenance and Checkout Facility (OMSB Cells A, B)	11/20/78	OMJM	11/20/80	05/20/84	Continental Heller Corp.
STS V-23	Launch Complex Pkg I (Launch Pad)	08/22/77	Sverdrup and Parcel	01/24/79	10/06/79	Morrison-Knudsen
STS V-23	Launch Complex Pkg II (Launch Control Ctr)	08/27/77	Sverdrup and Parcel	04/23/80	06/22/82	Joint Venture: Continental Heller Corp., Kasler, Fruin-Colnon Corporation
STS V-23	Launch Complex Pkg III	08/27/77	Sverdrup and Parcel	01/13/81		Santa Fe Engineering
STS V-27	Flight Crew Quarters	10/02/78	COE (Sacramento)	05/13/82	08/01/84	AJ Diani Construction Co.
STS V-28	Launch Complex Pkg IV (Launch Control Center)	08/01/80	Sverdrup and Parcel	05/07/80	05/24/81	HC Smith Construction Co.
STS V-31.1	Solid Rocket Booster Processing Facility (Vandenberg)	01/08/79	Norman Engineering	04/13/81	02/07/83	Joint Venture: Morrison-Knudsen and US Steel
STS V-32	Solid Rocket Booster Retrieval and Disassembly Facility	04/23/78	FSEC	04/10/83	08/03/85	Santa Fe Engineering
STS V-33	External Tank Processing Facility	05/05/78	COE (Sacramento)	03/13/81	12/15/82	Joint Venture: Morrison-Knudsen and US Steel
STS V-33A	Harbor and Towroute	05/05/78	COE (Sacramento)	10/06/82	08/31/84	Joint Venture: Ball & Ball, Brosacer Inc.
STS V-80	Orbiter Towroute	01/19/77	COE (Sacramento)	09/07/82	08/10/84	AJ Diani Construction Co.

APPENDIX FIVE

SPACE TRANSPORTATION SYSTEM CONSTRUCTION

project title	facility purpose/description	design dev award date	design firm	constr'n start date	occupancy date	contractor firm
STS V-80	Orbiter Tonway	01/19/79	COE (Sacramento)	01/06/82	08/01/83	Joint Venture: Ball & Ball; Brosamer, Inc.
STS V-86	Civil Utilities	10/10/78	COE (Sacramento)	10/22/80	11/13/81	Jamieson-Construction Co.
STS V-86	Electrical Utilities	11/23/78	Keller and Gannon	08/06/80	07/01/82	B & A Electric Co.
STS V-88	Logistics Facilities (NVAFB and SVAFS)	09/25/78	COE (Sacramento)	05/18/81	05/01/82	Riha Construction Co.
STS-IOSC	Integrated Operations Support Complex	05/24/79	Gruen and Associates	05/01/82	06/01/84	Cunningham
STS-SMEF	SAMTO Mgt Engineering Facility	05/24/79	Gruen and Associates	05/13/82	06/01/84	AJ Diani Construction Co.
STS	Shuttle Assembly Building	03/31/82	Bechtel National	01/15/83	10/30/84	Kaiser Engineers
STS	Facility Modifications to Launch Complex for Shuttle Assembly Buildings	04/15/82	Sverdrup and Parcel	08/01/82	01/03/83	(various)
STS	Launch Complex "Facility Mods"	01/15/83	Sverdrup and Parcel	06/01/82	01/07/85	Hensel Phelps
STS	Mission Operations Center, JSC	03/26/79	Black and Veatch	02/02/80	10/31/84	LL Taylor Construction Co.
STS	ELS Facility Security, KSC	10/15/80	Pan Am World Services	05/01/81	12/15/82	Geer Electric, ESS, A&R, Boeing Sv, K&S, Briscee, Butler, Kennedy, Ivey's Steel, Can Am, Vic Lane, Prefect Inc., BW Electrical, DH Lawrance
STS	Security Modifications, GSFC	08/14/83	Alpha Tech; GIC	03/22/85	11/30/86	Gassman, Carob, Bendix Accusnics, Evans
STS	GSFC Facility Security	07/01/81	Murry Blitz	04/01/83	11/01/85	D.H. Lawrance
STS	Physical and ADP Security, KSC	06/23/82	Pan American, Watson, PRC, Burns & Roe	04/01/83	08/05/85	Joint Venture: K&S Electric, Behe & Unhottz, Powers Electrical, Holloway Corp, Boland Construction
STS	Security, JSC	12/17/82	NASA (staff)	07/31/84	03/15/85	Schultz & Lembo, Inc.
STS	Security, VAFB		FSEC, SS&A	01/18/85	09/16/85	A.J. Diani Co.
STS SPIF	Shuttle Payload Integration Facility, CCAFS	06/01/80	Seely, Stevens, Valve & Knecht	07/17/81	03/15/84	Algernon Blair Inc.

APPENDIX FIVE

SPACE TRANSPORTATION SYSTEM CONSTRUCTION

project title	facility purpose/description	design dev award date	design firm	constr'n start date	occupancy date	contractor firm
STS	Hazardous Waste Management	11/26/82	Fluor	02/17/84	06/30/85	Marco Construction
STS	Security, Eastern Launch Sites	03/29/83	Reynolds, Smith & Hill; Pam Am			
STS	Safety Improvements	09/26/83	Fluor	01/24/85	06/30/85	Simpson & Associates
STS	Ice Suppression System		Sverdrup & Parcel, Martin Marietta	03/21/84	09/21/84	Pacific Mechanics Corp.
STS-SLC	Cryogenic Tanks	08/22/77	Sverdrup and Parcel	02/14/79	04/03/81	Chicago Bridge and Iron

APPENDIX SIX

AIR FORCE LAUNCH VEHICLE CHARACTERISTICS: BOOSTERS

vehicle	contractor	configuration	dimensions <1>	weight <2>	thrust at liftoff <3>	guidance <3>	status as of 30 Sept 84
ATLAS E	General Dynamics/Convair	Two and a half stage liquid fuel vehicle	10 x 67.8 ft	278,000 lbs	392,000 lbs	Radio	Still in use
ATLAS F	General Dynamics/Convair	Two and one-half stage liquid fuel vehicle	10 x 67.8 ft	266,000 lbs	388,000 lbs	Radio	No longer in inventory; last launch 23 June 1981 (successful)
ATLAS H	General Dynamics/Convair	Two and a half stage liquid fuel vehicle	10 x 62 ft	284,000 lbs	439,000 lbs	Radio	Still in use
CELV (Complementary Expendable Launch Vehicle)	Martin Marietta Corp.	Solid fuel with liquid stages	Length: 204 ft solid motor: 112.9 x 10.2 ft first stage: 86.5 x 10 ft second stage: 32.6 x 10 ft	Not available	1,600,000 lbs 546,000 lbs 104,000 lbs	Inertial	Contract not let at close of fiscal 1984 (awarded 28 February 1985 to Martin Marietta Corp. for its Titan III (34)D7 booster [renamed Titan IV in summer 1985] with Centaur G-Prime upper stage. CCAFS will be its permanent launch site.)
SCOUT	Ling-Temco-Vought Missile & Space Co.	Three, four or five stage solid fuel vehicle	3.75 x 75 ft (four-stage configuration)	47,500 lbs (four stage)	130,000 lbs (four stage)	Inertial	Still in use (NASA)
SPACE SHUTTLE	Martin Marietta Corp.	Single stage liquid fuel external tank and two solid fuel rocket boosters	76.6 x 184.2 ft (Orbiter alone = 56.67 x 122.2 ft)	4,400,000 lbs at takeoff; 187,000 lbs at landing	58,375,000 lbs	Manned vehicle	Still in use; first launch 12 Apr 1981 (successful); launched only by NASA until Vandenberg AFB launch facilities become available
THOR LV2D	McDonald Douglas Astronautics Co.	Single stage liquid fuel vehicle, used with Burner II upper stage	8 x 55.9 ft	105,884 lbs	172,000 lbs	Radio	No long in use; five remaining vehicles returned to Norton AFB in FY 80
THOR LV2F	McDonald Douglas Astronautics Co.	Single stage liquid fuel vehicle, used with Burner II or IIA upper stage	8 x 55.9 ft	105,884 lbs	172,000 lbs	Radio	No longer in inventory; last vehicle launched 14 July 1980 (unsuccessful)

<1> Diameter: 1st stage only; height: no payload or fairing <2> Fuel only (no payload) <3> Most advanced configuration of vehicle

APPENDIX SIX

AIR FORCE LAUNCH VEHICLE CHARACTERISTICS: BOOSTERS

vehicle	contractor	configuration	dimensions <1>	weight <2>	thrust at liftoff <3>	guidance <3>	status as of 30 Sept 84
THOR SLV2A (Thrust Augmented Thor)	McDonald Douglas Astronautics Co.	Single stage, liquid fuel vehicle with three strap-on solid rocket motors; used with Agena or Delta upper stages	8 x 65.9 ft	135,396 lbs	330,000 lbs	Radio	No long in use; five remaining vehicles returned to Norton AFB in FY 80
THOR SLV2H	McDonald Douglas Astronautics Co.	Single stage liquid fuel vehicle with three strap-on solid rocket motors	8 x 70.3 ft	183,484 lbs	330,000 lbs	Radio	No longer in use; one remaining vehicle retired to Norton AFB in FY 80
TITAN II	Martin Marietta Corp.	First stage: LR87 liquid (430,000 lbs); second stage: LR91 liquid (100,000 lbs)	10 x 93.6 ft	336,164 ft	430,000 lbs	Radio	Not yet in use; Sec Def directed modifications of inactivated Titan II ICBMs to space boosters on 25 Aug 1984
TITAN IIIB	Martin Marietta Corp.	Two-stage, liquid fuel vehicle. Used with Agena D upper stage vehicle	10 x 119.3 ft	386,000 lbs	453,000 lbs	Radio or inertial	Still in use
TITAN IIIC	Martin Marietta Corp.	Two stage liquid fuel vehicle with two strap-on solid rocket motors. Used with Transtage upper stage	10 x 108 ft (without payload)	1,400,000 lbs	2,400,000 lbs (solid rocket motors)	Transtage inertial	No longer in inventory; last launched 6 Mar 82 (successful)
TITAN IIID	Martin Marietta Corp.	Two stage liquid fuel vehicle with two strap-on solid rocket motors	10 x 108 ft (without payload)	1,300,000 lbs	2,400,000 lbs (solid rocket motors)	Radio	No longer in inventory; last launch 17 Nov 1982 (successful)
TITAN III(34)D	Martin Marietta Corp.	Two stage liquid fuel vehicle with two strap-on, solid rocket motors. Used with IUS and Transtage upper stages from CCAFS; no upper stage from VAFB	10 x 117 ft	1,500,000 lbs	2,800,000 lbs	Radio (VAFB); IUS or Transtage (CCAFS)	Still in use; first launched 30 Oct 1982

<1> Diameter: 1st stage only; height: no payload or fairing <2> Fuel only (no payload) <3> Most advanced configuration of vehicle

Military Uses of Space: 1946-1991

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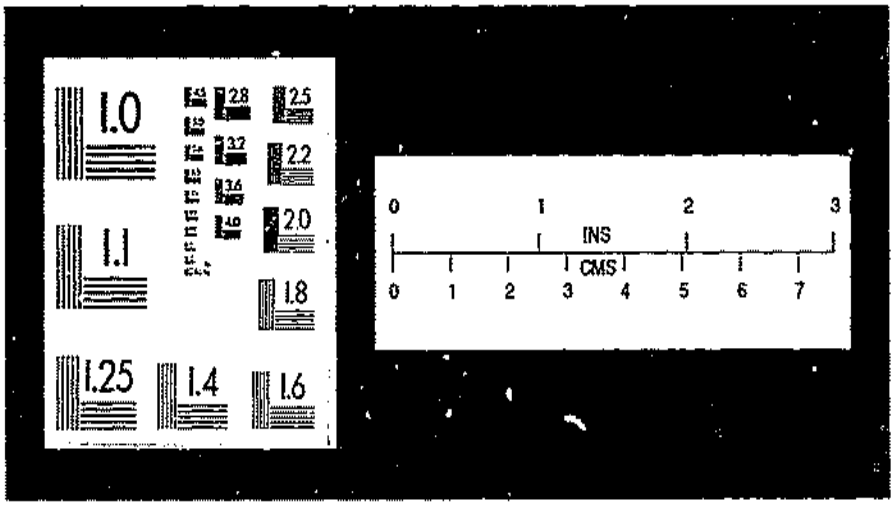

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APPENDIX SEVEN

AIR FORCE LAUNCH VEHICLE CHARACTERISTICS: UPPER STAGES

vehicle	contractor	configuration	dimensions	weight	liftoff thrust	guidance	FY 84 end status
Agena	Lockheed Missiles & Space Co.	Liquid fuel upper stage	Approximately 5 x 20 ft (some configurations are up to 40 ft long)	15,000 lbs	16,000 lbs	Inertial	Still in use (with Titan IIID and Atlas)
Centaur D1	General Dynamics/Convair	Liquid fuel upper stage	10 x 30 ft	37,000 lbs	30,000 lbs	Inertial	Still in use (with Atlas, by NASA)
Centaur G	General Dynamics/Convair	Liquid fuel upper stage	14.2 x 29.5 ft (G)	36,000 lbs	30,000 lbs	Inertial	Not yet available; under development for use by AF (G) and NASA (G')
IUS (Inertial Upper Stage)	Boeing Aerospace Co.	Solid fuel upper stage consisting of two stages	Stage I: 14.8 x 7.6 ft; Stage II: 6.4 x 9.6 ft	With Titan III 34D: 4,496.3 lbs (28,937.7 lbs fully fueled); with Space Shuttle: 4,756.4 lbs (32,419 lbs fully fueled)	Stage I: 62,000 lbs; Stage II:	Inertial	Still in use (with Titan 34D and Space Shuttle); first launch (Titan
PAM-D2 (Payload Assist Module D)	McDonnell-Douglas Astronautics Co.	Solid fuel upper stage	15.0 x 10 ft	13,710 lbs	25,000 lbs	Orbiter-based guidance	Not yet available; to be used by AF and NASA with Space Shuttle; first commercial acquisition SD has ever entered into
SGS II (Space Guidance System Block II) Stage Vehicle System	McDonnell-Douglas Astronautics Co.	Solid fuel upper stage consisting of two stages	43.64 in x 135.49 in	9,980 lbs	35,343 lbs	Inertial spin-stablized	Still in use (with Atlas); first launch 13 December 1981 (successful)
Transtage	Martin Marietta Corp.	Liquid fuel upper stage	10 x 15 ft	28,000 lbs	15,000 lbs	Inertial	Still in use (with Titan 34D)

APPENDIX EIGHT A

SPACE VEHICLE LAUNCHES

booster	upper stage	payload	payload sponsor	launch site	launch date	program	evaluation
ATLAS							
Atlas	Centaur	Sat F-3	Navy	VAFB	01/17/80	FLTSATCOM	successful
Atlas	Centaur	Sat F-5	Navy	CCAFS	08/06/81	FLTSATCOM	failure
Atlas E		classified		VAFB	12/08/80		failure
Atlas E		classified		VAFB	12/18/81	GPS	failure
Atlas E		DMSP F-6	AF	VAFB	12/20/82	DMSP	successful
Atlas E		NOAA-E	NOAA	VAFB	03/23/83	NOAA	successful
Atlas E		DMSP F-7	AF	VAFB	11/17/83	DMSP	successful
Atlas E		Sat F-7 (STP flight #S81-2)	AF Geophysical Laboratory	VAFB	12/17/83	DMSP	successful
Atlas F	SVS	NAVSTAR 5	AF	VAFB	02/09/80	GPS	successful
Atlas F		classified		VAFB	03/03/80	classified	successful
Atlas F	SVS	NAVSTAR 6	AF	VAFB	04/26/80	GPS	successful
Atlas F		NOAA-B	NOAA	VAFB	05/29/80	NOAA	failure
Atlas F		NOAA-C	NOAA	VAFB	05/23/81	NOAA	successful
Atlas F	SVS	NAVSTAR 7	AF	VAFB	12/18/81	GPS	failed
Atlas F	SGS II	NAVSTAR 8	AF	VAFB	07/14/83	GPS	successful
Atlas F	SGS II	NAVSTAR 9	AF	VAFB	05/13/84	GPS	successful
Atlas F	SGS II	NAVSTAR 10	AF	VAFB	09/09/84	GPS	successful
Atlas H		classified	NASA/AF	VAFB	02/09/83		successful
Atlas H		classified		VAFB	06/09/83		successful
Atlas H		classified		VAFB	02/05/84		successful

APPENDIX EIGHT A

SPACE VEHICLE LAUNCHES

booster	upper stage	payload	payload sponsor	launch site	launch date	program	evaluation
INERTIAL UPPER STAGE							
Titan 34D	IUS-2	DSCS II-F16, DSCS III-A1	AF	CCAFS	10/30/82	DSCS	successful
STS 6	IUS-1	TDRSS-A	NASA	KSC	04/04/83	NASA	qualified success
SCOUT							
Scout		Transit		VAFB	05/14/81		successful
SHUTTLE (SPACE TRANSPORTATION SYSTEM)							
STS 1		orbital flight test	NASA	KSC	04/12/81	STS	successful
STS 2		orbital flight test	NASA	KSC	11/12/81	STS	successful
STS 3		orbital flight test	NASA	KSC	03/22/82	STS	successful
STS 4		classified	AF	KSC	06/27/82	STS	successful
STS 5		SBS-3, ANIK-C	multiple	KSC	11/11/82	STS	successful
STS 6	IUS-1	TDRSS-A	NASA	KSC	04/04/83	STS	successful
STS 7		ANIC-C, PALAPA B-1, SPAS	multiple	KSC	06/18/83	STS	successful
STS 8		INSAT-1B	NASA	KSC	08/30/83	STS	successful
STS 9		Spacelab-1	NASA	KSC	11/28/83	STS	successful
STS 11		WESTAR-VI, PALAPA B-2, SPAS IA, CRBX	multiple	KSC	02/03/84	STP	successful
STS 13		LDEF-1, SOLAR MAX Repair, SYNCOM IV-2	multiple	KSC	04/06/84	STS	successful

APPENDIX EIGHT A

SPACE VEHICLE LAUNCHES

booster	upper stage	payload	payload sponsor	launch site	launch date	program	evaluation
STS 14		TELSTAR 3C, SBS-D, OAST-1	multiple	KSC	08/29/84	STS	successful
THOR							
Thor F-5		DMSP F-5	AF	VAFB	07/14/80	DMSP	failure
TITAN							
Titan III B		classified		VAFB	12/13/80		successful
Titan III B		classified		VAFB	02/29/81		successful
Titan III B		classified		VAFB	04/24/81		successful
Titan III B		classified		VAFB	01/21/82		successful
Titan III B		classified		VAFB	04/15/83		successful
Titan III B		classified		VAFB	07/31/83		successful
Titan III B		classified		VAFB	04/17/84		successful
Titan III B		classified		VAFB	08/28/84		successful
Titan III C		classified		CCAFS	10/01/79		successful
Titan III C		DSCS II-D13 DSCS II-D14		CCAFS	11/20/79	DSCS	successful
Titan III C		classified		CCAFS	03/16/81		successful
Titan III C		classified		CCAFS	03/06/82		successful
Titan III D		classified		VAFB	02/07/80		successful
Titan III D		classified		VAFB	05/18/80		successful
Titan III D		classified		VAFB	09/08/81		successful
Titan III D		classified		VAFB	05/11/82		successful
Titan III D		classified		VAFB	11/17/82		successful
Titan III D		classified		VAFB	11/17/82		successful

APPENDIX EIGHT A

SPACE VEHICLE LAUNCHES

booster	upper stage	payload	payload sponsor	launch site	launch date	program	evaluation
Titan III (34)D	IUS-2	DSCS II F16, DSCS III A1		CCAFS	10/30/82	DSCS	successful
Titan III (34)D		classified		VAFB	06/20/83		successful
Titan III (34)D	Transtage	classified		CCAFS	01/30/84		successful
Titan III (34)D	Transtage	classified		CCAFS	04/14/84		successful
Titan III (34)D		classified		VAFB	06/25/84		successful

APPENDIX EIGHT B

SPACE TEST PROGRAM EXPERIMENTS (1 Oct 79-30 Sep 84)

flt. no.	payload(s)	sponsor organization	launch site	launch vehicle	launch date	evaluation of launch
S81-1	1> solar flare energy conversion and solar acceleration mechanisms; 2> stimulated emission of energetic particles from magnetosphere into ionospher and atmostphere	Office of Naval Research	VAFB	expendable	1982	success
R-11	classified		KSC	Space Shuttle Orbiter 102 ("Columbia")	27 Jun 82	success
S83-1	Space Ultraviolet Radiation Environment (SURE): used an extreme ultraviolet spectrometer to obtain background radiation data from earth and upper atmosphere; first paylod to fly as a GAS (get away special) and first payload to use a GAS can opening lid	Naval Research Laboratory	KSC	Space Shuttle Orbiter 099 ("Challenger")	18 Jun 83	success
P83-1	1> High Latitude (HILAT): four experiments to measure distortions imposed on radio waves propogating through polar region plasma.	Defense Nuclear Agency	VAFB	Scout	27 Jun 83	success
	2> Auroral Ionospheric Mapper experiment to investigate vacuum ultraviolet emissions for missile detection and surveillance.	AF Geophysics Laboratory				
S81-2	Ionospheric Current Systems and Auroras Experiment used a magnetometer to measure in situ variations of the magnetic field caused by field-aligned currents associated with auroral activities.	AF Geophysics Laboratory	VAFB	Atlas E (flown aboard DMSP sat F-7)	17 Nov 83	success
Q0001	Auroral Photography Experiment photographed auroras to learn size, intensity and other characteristics, and how they affected the orbiter; first Quick Response Shuttle Payload (QRSP)	AF Geophysics Laboratory	KSC	Space Shuttle Orbiter 102 ("Columbia")	28 Nov 83	success

APPENDIX EIGHT B

SPACE TEST PROGRAM EXPERIMENTS (1 Oct 79-30 Sep 84)

flt. no.	payload(s)	sponsor organization	launch site	launch vehicle	launch date	evaluation of launch
S84-5	Cosmic Ray Upset Experiment quantified soft error upsets in microelectronic memory circuits caused by cosmic rays; second GAS payload by STP	SD Deputy for Acquisition Logistics; developed by NASA's Goddard Space Flight Center	KSC	Space Shuttle Orbiter 099 ("Challenger")	3 Feb 84	success
S80-1	Five experiments (out of 57) in Long Duration Exposure Facility (LDEF):		KSC	Space Shuttle Orbiter 099 ("Challenger")	6 Apr 84	success
	1> fiber optics experiment	AF Weapons Laboratory				
	2> spacecraft materials	SD				
	3> heavy ions in space	Naval Research Laboratory				
	4> energy spectrum of trapped protons	AF Geophysics Laboratory				
	5> effects of space environment on components of radiation and electro-optical sensors	AF Technical Applications Ctr				
00002	Cloud Formation, Dissipation and Opaqueness (CLOUDS) documented cloud cover dynamics and morphology near weather stations where ground measurements could be made concurrently; second GRSP.	Air Weather Service	KSC	Space Shuttle Orbiter 103 ("Discovery")	29 Aug 84	success
S85-1	1> Upper Atmosphere Composition Spectrometer (UACS) determined composition and density of upper atmosphere in relation to solar angle, solar activity, magnetic activity and other variables in order to predict changes in satellite orbits	AFSC	VAFB	expendable	1984	success
	2> Polar Ozone and Aerosols Measurement (POAM) gathered information about vertical profiles of ozone and aerosols at high latitudes and about effects of polar atmospheric density on optical systems.	Office of Naval Research				

APPENDIX NINE

SATELLITE CHARACTERISTICS

satellite	mission	spacecraft contractor	program go-ahead	deployed dimensions	lbs weight	initial wattage power	design life	orbit
Defense Meteorological Satellite Program (DMSP)	weather observation	RCA Government Systems Division						450 nautical miles near-polar sun-synchronous
Block 5D-1			03/72	4 x 19.3 ft	1,131	290	2 1/2+ years	
Block 5D-2				4 x 21 ft	1,656	300	2 1/2+ years	
Defense Satellite Communications System (DSCS)	Communications							geosynchronous equatorial
Phase II		TRW Systems Group	03/69	9 x 13 ft	1,181 (dry, 1,365 (wet)	535	5 yrs	
Phase III		General Electric	02/77	38 ft 2 in x 6 ft 8 in	1,876 (dry) 1,476 (wet)	1100	10 yrs	
Fleet Satellite Communications System (FLTSATCOM) (satellites 1-5 only)	Communications	TRW Space and Defense Systems Group	10/73	diam: 8 ft; height: 50 in antennae: 16 ft and 13.5 ft	4,100 (entering transfer orbit)	1,250	5 yrs	geosynchronous equatorial
Global Positioning System (GPS) (NAVSTAR)		Rockwell International	12/73					10,900 nautical mile circular orbit
Block I	Navigation			210 in (solar array span)	orbit: 1,016 launch: 1,920	410	5 yrs	
Block I (replenishment)	Navigation/NUDET detection			210 in (solar array span)	orbit: 1,157 launch: 1,900	410	5 yrs	
Block II	Navigation/NUDET detection			227.5 in (solar array span)	orbit: 1,860 launch: 3,675	700	7.5 yrs	
NATO Phase III Communications Satellite	Communications	Ford Aerospace & Communications Corp.	03/73	diam: 86 in; height (with antennas): 113 in	launch 1,6.. orbit: 370	543	7 yrs	geosynchronous equatorial

APPENDIX TEN

SATELLITE LAUNCHES

program/payload	launch site	launch vehicle	launch date	satellite status
NATO IIIA	Cape Canaveral	Delta 2914 (NASA)	04/22/76	still operational through Sept 84
NATO IIIB	Cape Canaveral	Delta 2914 (NASA)	01/27/77	still operational through Sept 84
NATO IIIC	Cape Canaveral	Delta 2914 (NASA)	11/18/78	still operational through Sept 84
NATO IIID	Cape Canaveral	Delta 2914 (NASA)	11/14/84	still operational through Sept 84
DSCS II B-4	Cape Canaveral	Titan IIIC	12/13/73	retired Aug/Sep 84
DSCS II C-7	Cape Canaveral	Titan IIIC	05/12/77	still operational through Sept 84
DSCS II C-8	Cape Canaveral	Titan IIIC	05/12/77	still operational through Sept 84
DSCS II C-11	Cape Canaveral	Titan IIIC	12/13/79	still operational through Sept 84
DSCS II C-12	Cape Canaveral	Titan IIIC	12/13/78	still operational through Sept 84
DSCS II D-13	Cape Canaveral	Titan IIIC	11/20/79	still operational through Sept 84
DSCS II D-14	Cape Canaveral	Titan IIIC	11/20/79	still operational through Sept 84
DSCS II F-16	Cape Canaveral	Titan 34-D/IUS	10/30/82	still operational through Sept 84
DSCS III A-1	Cape Canaveral	Titan 34-D/IUS	10/30/82	still operational through Sept 84
NAVSTAR #1	Vandenberg	Atlas F/SVS	02/22/78	still operational through Sept 84
NAVSTAR #2	Vandenberg	Atlas F/SVS	05/13/78	failed 1 July 80
NAVSTAR #3	Vandenberg	Atlas F/SVS	10/05/78	still operational through Sept 94
NAVSTAR #4	Vandenberg	Atlas F/SVS	12/11/78	still operational through Sept 84

APPENDIX TEN

SATELLITE LAUNCHES

program/payload	launch site	launch vehicle	launch date	satellite status
NAVSTAR #5	Vandenberg	Atlas/SVS	02/09/80	failed 11/28/83
NAVSTAR #6	Vandenberg	Atlas/SVS	04/26/80	still operational through Sept 84
NAVSTAR #7	Vandenberg	Atlas/SVS	12/18/81	never operational (booster failure)
NAVSTAR #8	Vandenberg	Atlas/SGS II	07/14/83	still operational through Sept 84
NAVSTAR #9	Vandenberg	Atlas/SGS II	06/13/84	still operational through Sept 84
NAVSTAR #10	Vandenberg	Atlas/SGS II	09/09/84	still operational through Sept 84
DMSP F-2	Vandenberg	Thor	06/05/77	failed 17 Feb 80
DMSP F-3	Vandenberg	Thor	04/30/78	partial failure 2 Dec 79
DMSP F-4	Vandenberg	Thor	06/06/79	failed 8 Aug 80
DMSP F-5	Vandenberg	Thor	07/14/80	never operational
DMSP F-6	Vandenberg	Atlas	12/20/80	still operational through Sept 84
DMSP F-7	Vandenberg	Atlas	11/17/83	still operational through Sept 84
FLTSATCOM F-1	Cape Canaveral	Atlas/Centaur (NASA)	02/09/78	still operational through Sept 84
FLTSATCOM F-2	Cape Canaveral	Atlas/Centaur (NASA)	05/04/79	still operational through Sept 84
FLTSATCOM F-3	Cape Canaveral	Atlas/Centaur (NASA)	01/17/80	still operational through Sept 84
FLTSATCOM F-4	Cape Canaveral	Atlas/Centaur (NASA)	10/30/80	still operational through Sept 84
FLTSATCOM F-5	Cape Canaveral	Atlas/Centaur (NASA)	08/06/81	never operational

GLOSSARY

AA	Deputy for Attack Assessment
AACB	Aeronautics and Astronautics Coordinating Board
ABG	Air Base Group
ABM	Antiballistic Missile
ABRES	Advanced Ballistic (Missile) Reentry System
ABRV	Advanced Ballistic Reentry Vehicle
ACE	Advanced Control Experiment
ADP	Automated Data Processing
AEC	Atomic Energy Commission
AFB	Air Force Base
AFBMD	Air Force Ballistic Missile Division
AFC	Air Force Council
AFCCDD	Air Force Command Control Development Division
AFCGM	Assistant Chief of Staff for Guided Missiles
AFCMD	Air Force Contract Management Division
AFCC	Air Force Communications Command
AFETR	Air Force Eastern Test Range
AFFTC	Air Force Flight Test Center
AFGE	American Federation of Government Employees
AFGL	Air Force Geophysics Laboratory
AFLC	Air Force Logistics Command
AFML	Air Force Materiels Laboratory
AFMTC	Air Force Missile Test Center
AFPRO	Air Force Plant Representative Office
AFRPL	Air Force Rocket Propulsion Laboratory
AFSATCOM	Air Force Satellite Communications System
AFS	Air Force Station
AFSC	Air Force Systems Command
AFSCF	Air Force Satellite Control Facility
AFSCN	Air Force Satellite Control Network
ASE	Airborne Support Equipment
AFSTC	Air Force Space Technology Center
AFWL	Air Force Weapons Laboratory
AFWTR	Air Force Western Test Range
AGE	Aerospace Ground Equipment
AIRS	Advanced Inertial Reference Sphere
ALC	Air Logistics Center
ALCC	Airborne Launch Control Center
ALCS	Airborne Launch Control System
AMaRV	Advanced Maneuvering Reentry Vehicle
AMC	Air Materiel Command
AMR	Atlantic Missile Range
AMU	Astronaut Maneuvering Unit
Annex/ORT	Annex/Operational Readiness Trainer
ANT	Advanced Nosetip Test
APN	Advanced Plub Nosetip
ARDC	Air Research and Development Command
ARPA	Advanced Research Projects Agency
ARTS	Automated Remote Tracking Station
ASAT	Anti-Satellite Program
ASD/R&E	Assistant Secretary of Defense for Research and Engineering
ASGD	Assigned
ASLC	Adaptive Sidelobe Cancellation System

ASRDL	Army Signal Research and Development Laboratory
ASSET	Aerothermodynamic/Elastic Structural Systems Environmental Tests
ATDA	Augmented Target Docking Adapter
ATG	Aerospace Test Group
ATS	Applications Technology Satellite
ATW	Aerospace Test Wing
AUTH	Authorized
AV	Audiovisual
BAMM	Balloon Altitude Mosaic Measurements
BMC	Ballistic Missile Center
BMC	Ballistic Missile Committee
BMEWS	Ballistic Missile Early Warning System
BES	Budget Estimate Submission
BMO	Ballistic Missile Office
BMP	Background Measurements Probe
BOD	Beneficial Occupancy Date
Brig	Brigadier
BSD	Ballistic Systems Division
BTL	Bell Telephone Laboratories
C^3	Command and Control Communications
CAS	Contract Administration Support
CBD	Commerce Business Daily
CCAFS	Cape Canaveral Air Force Station, Florida
CCMS	Control, Check-Out and Monitor Subsystem
CCP	Continuing Compliance Program
CDB	Command Data Buffer
CDM	Continuously Dispensed Masker
CDR	Critical Design Review
C-E	Communications-Electronics
CELV	Commercial Expendable Launch Vehicle
CELV	Complementary Expendable Launch Vehicle
CESO	Communications-Electronics Support Office
CFP	Concept Formulation Package
CINCSAC	Commander-in-Chief, Strategic Air Command
CIRRESI	Cryogenic Infrared Radiance Instrumentation for Shuttle
CISS	Centaur Integrated Support System
CM	Controlled Mode
CMC	Communication Manufacturing Comapny
COE	Corps of Engineers
COM Command	Air Force Communication Command
COR	Contract Operations Review
CPV	Common Pressure Vessel
CRRES	Combined Release and Radiation Effects Satellite
CRUX	Cosmic Ray Upset Experiment
CS	Communication Segment
CSC	Computer Sciences Corporation
CSD	Chemical Systems Division of United Technologies Corporation
CSOC	Consolidated Space Operations Center
C/SSR	Cost/Schedule Status Review
DABM	Defense Against Ballistic Missiles

DAR	Defense Acquisition Regulation
DARPA	Defense Advanced Research Projects Agency
DASO	Demonstration and Shakedown Operation
DATS	Despun Antenna Test Satellite
D/BMRS	Deputy for Ballistic Missile Reentry Systems
DCA	Defense Communications Agency
DCAA	Defense Contract Adminstration Agency
DCAS	Deputy Commander AFSC for Aerospace Systems
DCP	Development Concept Paper
DCS	Deputy Chief of Staff
DCS/S&L	Deputy Chief of Staff for Systems and Logistics
DDR&E	Director of Defense Research and Engineering
Deg	Degree
DET	Detachment
Dev	Development
DEW	Directed Energy Weapons
D&F	Determination and Finding for Authority to Negotiate
Dia/Diam	Diameter
DINS	Dormant Inertial Navigation System
DLA	Defense Logistics Agency
DMSP	Defense Meteorological Satellite Program
DNA	Defense Nuclear Agency
DNSDP	Defense Navigation Satellite Development Program
DoD	Department of Defense
DODGE	Defense Department Gravity Gradient Experiment
DPL	Dual Propellant Loading
DRB	Defense Resources Board
DSARC	Defense Systems Acquisition Review Council
DSCS	Defense Satellite Communications System
DSM	Data Systems Modernization
DSMC	Defense Systems Management College
DSMG	Designated Systems Management Group
DSS	Defense Support Systems
DT&E	Development, Test and Evaluation
ECP	Engineering Change Proposal
EHF	Extremely High Frequency (20 Gigahertz)
ELC	Earth-Limb-Clutter
ELMS	Earth Limb Measurement Satellite
ELV	Expendable Launch Vehicle
ENEC	Extendable Nozzle Exit Cone
ERRP	Equipment Refurbishment and Replacement Plan
ERTS	Emergency Remote Tracking Station
ERTS	Environmental Resources Technology Satellite
ESD	Electronics Systems Division
ESSA	Environmental Science Services Administration
ESMC	Eastern Space and Missile Center
ETR	Eastern Test Range
EVA	Extra Vehicular Activity
FACC	Ford Aerospace and Communications Corporation
FDMA	Standard Frequency Division Multiple Access
FFP	Firm-Fixed-Price
FLAME	Fighter Launch Advanced Materials Experiment
FLTSATCOM	Fleet Satellite Communications System

FOC	Full Operational Capability
FOT	Follow-on Operational Test
FS	Facilities Segment
FSED	Full-Scale Engineering Development
FSV	Flight Space Vehicle (= NAVSTAR in orbit)
FTM	Flight Test Missile
FY	Fiscal Year (1 October-30 September)
GAS	Get-Away Special
GAATV	Gemini/Atlas/Agena/Target Vehicle
GATV	Gemini Agena Target Vehicle
G&C	Guidance and Control
GCN	Ground Communications Network
GD	General Dynamics Corporation
GE	General Electric Company
Gen	General
GERTS	General Electric Radio Tracking Station
GLV	Gemini Launch Vehicle
GMRD	Guided Missile Research Division
GO	General Order
GOR	General Operational Requirement
GPS	Global Positioning System (NUDET Detection System)
GREB	Galactic Radiation Experiment Background
GSA	General Services Administration
GSE	General Systems Engineering
GSFC	Goddard Space Flight Center
HALO	High Altitude Large Optics
H&D	Hardened and Dispersed
HEAO	High Energy Astronomy Observatory
HEST	High Explosive Simulation Test
HGM-25A	Titan I Missile
HILAT	High Latitude
HIPS	Hardcopy Image Processing System
HOSC	Huntsville Operations Support Center (MSFC)
HQ	Headquarters
HRS	Hard Rock Silo
IBM	International Business Machines Inc.
IBMS	Intercontinental Ballistic Missile System
ICBM	Intercontinental Ballistic Missile
ICSA	Ionospheric Current Systems and Auroras Experiment
IDCSP	Initial Defense Communications Satellite Program
IDCU	Improved Digital Computer Unit
IDSCS	Initial Defense Satellite Communication System
IG	Inspector General
IGS	Inertial Guidance System
IGY	International Geophysical Year
IMF	Integrated Maintenance Facility
INTLSATCOM	International Satellite Communications
IOC	Initial Operational Capability
IONDS	Integrated Operational Nuclear Detonation (NUDET) Detection System
IOSC	Integrated Operations Support Center
IOT&E	Initial Operational Test and Evaluation

IR	Infrared
IRBM	Intermediate Range Ballistic Missile
IRR	Independent Readiness Review
ITL	Integrate-Transfer-Launch
ITOS	Improved TIROS Operational Satellite
ITS	Improved Third Stage
ITV	Instrumented Test Vehicle
IUS	Inertial Upper Stage
IUS	Interim Upper Stage
JCS	Joint Chiefs of Staff
JPASO	Joint Pacific Area Scheduling Office
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
JSSMO	Joint Service Support Management Plan
KEW	Kinetic Energy Weapons
KMR	Kwajalein Missile Range
KSC	Kennedy Space Center
Lasercom	Laser Communications
Lb(s)	Pound(s)
LBRV	Large Ballistic Recovery Vehicle
LCC	Launch Control Center
LCS	Lincoln Calibration Sphere
LDEF	Long Duration Exposure Facility
LeRC	Lewis Research Center
LES	Lincoln Experimental Satellite
Lt	Lieutenant
LF	Launch Facility
LGM-25C	Titan II Missile Designation
LGM-30B	Improved Minuteman I Missile Designation
LGM-30F	Minuteman II Missile Designation
LGM-30G	Minuteman III Missile
LOX/RP-1	Liquid Oxygen/Hydrocarbon
LTTAT	Long Tank Thrust Augmented Thor (launch vehicle)
LV	Deputy for Launch Vehicles
MA-3	Titan II Engine
MADAN	Multimission Altitude Determination and Autonomous Navigation
Maj	Major
MAP	Multiple Aimpoint
MaRV	Maneuvering Reentry Vehicle
MBRV	Maneuvering Ballistic Reentry Vehicle
MCC	Mission Control Complex
MCC-K	Mission Control Complex Kernel
MCDAC	McDonnell Douglas Astronautics Company
MCP	Military Construction Program
MCT	Mobile Communications Terminal
MDR	Mission Dress Rehearsal
MGT	Mobile Ground Terminal
MHAT	Mechanical High Altitude Timer
MiDAS	Missile Detection Alarm System
MILSATCOM	Military Satellite Communications

MILSTAR	Communications Satellite successor to FLTSATCOM
MINT	Miniature Instrumented Nosetip Test
MIPR	Military Interdepartmental Purchase Request
MIRV	Multiple Independently Targetable Reentry Vehicles
MIT	Massachusetts Institute of Technology
MITS	MOD/IPS/TACAN Subsystem
MMAC	Martin Marietta Aeronautics Corporation
MMRBM	Mobile Mid-Range Ballistic Missile
MN	Deputy for Minuteman
MOA	Memorandum of Agreement
MOL	Manned Orbiting Laboratory
MOM	Modified Operational Missile
MOTP	Minuteman II Operational Targeting Program
MOU	Memorandum of Understanding
Mph	Miles Per Hour
MRR	Mission Readiness Review
MSFC	Marshall Space Flight Center
MSFSG	Space Division Detachment 2, Manned Space Flight Support Group
MSFG	Marshall Space Flight Center
MSMP	Multispectral Measurements Program
MSS	Missile Suspension System
MSSTM	Military Space Systems Technology Model
MST	Mobile Service Tower
MSV	Materials Screening Vehicle
MTG	Missile Test Group
MTS	Member of the Technical Staff (Aerospace Corporation)
MX	Missile X
MX-1593	Project Atlas
N/A	Not Applicable
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NAVSTAR	GPS Satellite On-orbit Designation
NCC	Network Control Center
NCS	Network Control Segment
NES	Northern European Station
NGS	Network Ground System
NOAA	National Oceanic and Atmospheric Administration
NRD	National Range Division
NSAHWG	Network Security Ad Hoc Working Group
NSC	National Security Council
NSDD	National Security Decision Directive
NTE	Not To Exceed
NTS	Navigation Technology Satellite
NUDET	Nuclear Detection
OAMS	Orbital Attitude and Maneuvering System
OAR	Off-Axis Rejection
OBL	Operational Base Launch
OBLSS	Operational Base Launch Safety System
OCC	Operations Command Center
OCPO	Air Force Office of Civilian Personnel Operations
ODOL	On-Board Digital Data Load

ODDR&E	Office of the Director of Defense Research and Engineering
OL	Operating Location
OLS	Operational Linescan System
OLS2	Operational Linescan System #2
O&M	Operations and Maintenance
OMB	Office of Management and Budget
OMCF	Orbiter Maintenance and Checkout Facility
OOAMA	Ogden Air Material Area
OPM	Office of Personnel Management
OPS	Operations
OSAF	Office of the Secretary of the Air Force
OSC	Orbital Sciences Corporation
OSD	Office of the Secretary of Defense
OSMC	Operational Software Maintenance Complex
OT	Operational Test
OTL	Operational Test Launch
OV	Orbiting Vehicle
PACE	Programmable Aerospace Control Equipment
PAM	Payload Assist Module
PAN	Polyacylonitrile
PAR	Program Assessment Review
PBCS	Post Boost Control System
PCA	Physical Configuration Audit
PDM	Program Decision Memorandum
PDMM	Pulse Doppler Map Matching
PDR	Preliminary Design Review
PILOT	Piloted Low-Speed Test
PIM	Performance Improvement Modification
PMD	Program Management Directive
PMOG	Pyrotechnic Metal Oxide Generator
POM	Program Objective Memorandum
PMR	Pacific Missile Range
PMRTWG	Program Management Responsibility Transfer Working Group
PP	Procurement and Production
PPS	Primary Propulsion System
PR	Purchase Request
PRIME	Precision Recovery Including Maneuvering Reentry
PSI	Pounds per Square Inch
PTV	Pathfinder Test Vehicle (a Titan 34D/IUS configuration)
PVM	Production Verification Missile
QRSP	Quick Response Shuttle Payload
QTV	Qualification Test Vehicle (part of IUS program)
RAD	Requirements Action Directive
RADCAT	Radar Calibration Target
RAF	Royal Air Force (Great Britain)
RAP	Restricted Access Processor
RCA	Radio Corporation of America
RCC	Resource Control Complex
R&D	Research and Development
RDT&E	Research, Development, Test, and Evaluation
RFP	Request for Proposal
RMP	Reentry Measurements Program

ROCS	Range Only Correlation System
RS	Deputy for Reentry Systems
RSO	Range Safety Officer
RTS	Remote Tracking Stations
RTV	Reentry Test Vehicle
RVTO	Reentry Vehicle Technology and Observables
S3	Small Secondary Satellite
SAC	Strategic Air Command
SAFSCOM	Safeguard Systems Command
SALT	Strategic Arms Limitation Treaty
SAMAST	Sandia ABRES Materials and System Test
SAMOS	Satellite and Missile Observation System
SAMS	Scandia ABRES Materials Study
SAMSO	Space and Missile Systems Organization
SAMSP	Science and Applications Manned Space Platform
SAMTEC	Space and Missile Test Center
SAMTO	Space and Missile Systems Test Organization
SAPO	Special Aircraft Project Office
SAR	Supplemental Advisory Report
SATAF	Shuttle Activation Task Force
SATKA	Surveillance, Acquisition, Tracking and Kill Assessment
SBA	Small Business Administration
SBAMA	San Bernardino Air Material Area
SBRC	Santa Barbara Research Center
SCATHA	Spacecraft Charging at High Altitudes
SCC	Space Communications Corporation (also Spacecom)
SCCE	Satellite Configuration Control Element
SCF	Satellite Control Facility
SCN	Satellite Control Network
SCORE	Signal Communicaitons Orbiting Relay Equipment
SCS	Security Control System
SCTIS	Single Channel Transponder Injection Subsystem (DSCS)
SD	Space Division
SDHS	Satellite Data Handling System
SDI	Strategic Defense Initiative
SDR	System Design Review
SDI	Strategic Defense Initiative
SDS	Satellite Data System
SDS	Space Defense System
SE	Support Element
SecDef	Secretary of Defense
SECOR	Sequential Collation of Range
SED	Sensor Evolutionary Development
SES	Senior Executive Service
SESP	Space Experiment Support Program
SE/TD	Systems Engineering and Technical Direction
SEWS	Satellite Early Warning System
SFT	Supplemental Flight Test
SGS	Space Guidance System Block II Stage Vehicle System
SHAFE	Supreme Headquarters Allied Forces Europe
SHF	Super High Frequency (7-8 Gigahertz)
SHIP	Small Hardened Inertial Platform
SIRE	Satellite Infrared Experiment
SK	Deputy for Space Communications

SLC	Space Launch Complex
SLV	Standard Launch Vehicle
SLV-1	Scout Launch Vehicle
SLV-2A	Thrust Augmented Thor Launch Vehicle
SLV-2G	Long Tank Thor Launch Vehicle
SLV-2H	Long Tank Thrust Augmented Thor Launch Vehicle
SLV-2J	Long Tank Thrust Augmented Thor/Delta Launch Vehicle
SLV-2K	Long Tank Thrust Augmented Thor/Delta Launch Vehicle
SLV-3A	Atlas/Agena Launch Vehicle
SLV-3C	Atlas/Centaur Launch Vehicle
SLV-3D	Atlas/Centaur Launch Vehicle
SLV-5A	Titan IIIA Launch Vehicle
SLV-5B	Titan IIIB/Agena Launch Vehicle
SLV-5C	Titan IIIC Launch Vehicle
SLV-5D	Titan IIID Launch Vehicle
SMAB	Solid Motor Assembly Building
SMD	System Management Directive
SMEF	SAMTO Management and Engineering Facility
SMS	Strategic Missile Squadron
SMW	Strategic Missile Wing
SO	Special Order
SOA	Separate Operating Agency
SOC	Satellite Operations Center
SOLRAD	Solar Radiation
SOPC	Shuttle Operations and Planning Complex
Spacecom	Space Communications Company (also SCC)
SPACECMD	Air Force Space Command
SPADCCS	Space Defense Command and Control System
SPADOC	Space Defense Operations Center
SPD	System Program Directive
SPIF	Shuttle Payload Integration Facility
SPO	System Program Office
SPS	Simplified Processing Station
SRK	Sounding Rocket
SRM	Solid Rocket Motor
SSD	Space Systems Division
SSJ	Sole Source Justification
SSM/I	Microwave Imager
SSM/T	Microwave Temperature Sounder
SSP	Space Support Program (Thor Launch Vehicle Program)
SSPO	Strategic System Program Office
SSS	Strategic Satellite System
SSS	Sortie Support System
SSTTP	Safeguard System Test Vehicles Program
SSV	Deputy for Launch Vehicles
SSVL	Gemini Launch Vehicle Directorate
ST	Scientific and Professional
START	Spacecraft Technology and Advanced Reentry Tests
STC	Satellite Test Center
STDN	Space Tracking and Data Network
STG	Shuttle Test Group
STL	Space Technology Laboratories
STM	Special Test Missile
STP	Space Test Program
STRAD	Strategic Aerospace Division

STREP	System Technology Reentry Experiments Program
STS	Space Transportation System
STSS	SAC Targeting Support Software
STVN	Secure Voice Teleconference Network
SURE	Space Ultraviolet Radiation Environment
SZH	Defense System Applications Program System Program Office
TAC	Tactical Air Command
TACAN	Tactical Air Navigation
TACSAT	Tactical Communications Satellite
TACSATCOM	Tactical Satellite Communications
TAD	Thrust Augmented Thor/Delta (launch vehicle)
TAD	Technical Acceptance Demonstration
TAT	Thrust Augmented Thor (launch vehicle)
TATER	Talos-Terrier-Recruit (launch vehicle)
TBM	Tactical Ballistic Missile
TCNT	Transpiration Cooled Nosetip
TCP	Technical Change Proposal
TDC	Technical Data Center
TDC	Technology Development Corporation
TDMA	Time Division Multiple Access
TDRSS	Tracking and Data Relay Satellite System (NASA)
TDV	Technology Development Vehicle
TE	Training Element
TI	Texas Instruments
TIROS	Television and Infrared Observation Satellite
TMGS	Transportable Mobile Ground Station
TMRBM	Transportable Mid-Range Ballistic Missile
TRANSIT	Navy Satellite
TRW	Thomson-Ramo-Wooldridge
TS	Timing Subsystem
TS	Training Support
TT&C	Telemetry, Tracking and Command
TVC	Thrust Vector Control
TWTA	Traveling Wave Tube Amplifier
UDMH	Unsymmetrical Dimethylhydrazine
UHF	Ultra-High Frequency
ULMS	Undersea Long Range Missile System
UPS	Uninterruptable Power Supply
USAF	United States Air Force
USDR&E	AF Under Secretary of Defense for Research and Engineering
USSR	Union of Soviet Socialist Republics
UTC	United Technology Center
UVR	Ultra-Violet Radiometer
V-2	World War II German Ballistic Guided Missile
WADC	Wright Air Development Center
WADD	Wright Air Development Division
WS 107A-1	Atlas Missile Designation
WS 107A-2	Titan Missile Designation
WS 107B	Titan I Missile Designation
WS 107C	Titan II Missile Designation
WS 117L	Advanced Satellite System Designation

WS 133A	Minuteman I Missile Designation
WS 315A	Thor Missile Designation
WS 690A	Blue Scout Launch Vehicle Designation
WSMC	Western Space and Missile Center
WSMR	White Sands Missile Range
WSU	Weather Support Unit
WTR	Western Test Range
WWD	Western Development Division
XR	Deputy for Development Plans
XRN	Directorate for Defense Navigation Satellite System
XSM-65	Atlas Missile Designation
XSM-68	Titan Missile Designation
XSM-68B	Titan II Missile Designation
XSM-75	Thor Missile Designation
XSM-78	Jupiter Missile Designation
YD	Deputy for Defense System Application Program
YE	Deputy for Defense Navigation Satellite